UNITED STATES AIR FORCE

SUMMER FACULTY RESEARCH PROGRAM
1986
PROGRAM MANAGEMENT REPORT
UNIVERSAL ENERGY SYSTEMS, INC.

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SUBMITTED TO
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USAF SUMMER FACULTY RESEARCH PROGRAM - 1986

The United States Air Force Summer Faculty Research Program - USAF-SFRP) is a program designed to introduce university, college, nd technical institute faculty members to Air Force research. This s accomplished by the faculty member being selected on a nationally dvertised, competitive basis for a ten-week assignment during the ummer intersession period to perform research at Air Force aboratories/centers and research activities. Each assignment is in subject area and at an Air Force facility mutually agreed upon by he faculty member and the Air Force. In addition to compensation and ravel, cost of living allowances are also paid. The USAF-SFRP is ponsored by the Air Force Office of Scientific Research, Air Force ystems Command, United States Air Force, and is conducted by Universal Energy Systems, Inc.

The specific objectives of the 1986 USAF-SFRP are:

(1) To provide a productive means for scientists and engineers holding advanced degrees to participate in research at various Air Force research activities;

(2) To stimulate continuing professional association among the scholars and their professional peers in the Air Force;

(3) To further the research objectives of the United States Air rce;

(4) To enhance the research productivity and capabilities of scientists and engineers especially as these relate to Air Force technical interests.

During the summer of 1986, 158 faculty members participated in the USAF-SFRP. These researchers were assigned to approximately 25 USAF laboratories/centers and research activities across the country. A Management Report along with a three volume Technical Report consisting of a compilation of the final reports written by the assigned faculty members describing their summer research efforts is provided by the contractor, Universal Energy Systems.

UNITED STATES AIR FORCE

SUMMER FACULTY RESEARCH PROGRAM

1986

PROGRAM MANAGEMENT REPORT

UNIVERSAL ENERGY SYSTEMS, INC.

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Submitted to

Air Force Office of Scientific Research

Bolling Air Force Base

Washington, DC

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I. INTRODUCTION

Universal Energy Systems, Inc. (UES) was awarded the United States Air Force Summer Faculty Research Program on August 15, 1984. The contract is funded under the Air Force Systems Command by the Air Force Office of Scientific Research.

The program has been in existance since 1978 and has been conducted by several different contractors. The success of the program is evident from its history of expansion since 1978.

The Summer Faculty Research Program (SFRP) provides opportunities for research in the physical sciences, engineering, life sciences, business, and administrative sciences. The program has been effective in providing basic research opportunities to the faculty of universities, colleges, and technical institutions throughout the United States. A listing of Research Reports is included in Appendix III.

The program is available to faculty members in all academic grades: instructor, assistant professor, professor, department chairman, and research facility directors. It has proven especially beneficial to young faculty members who are starting their academic research programs and to senior faculty members who have spent time in university administration and are desirous of returning to scholarly research programs.

Keywords: Air Force Research, Research Management. (AW)

Beginning with the 1982 program, research opportunities were provided for 17 graduate students. The 1982 pilot student program was highly successful and was expanded in 1983 to 53 students; there were 84 graduate students in the 1984 program.

In the previous programs, the graduate students were selected along with their professors to work on the program. Starting with the 1985 program, the graduate students were selected on their own merits. They were assigned to be supervised by either a professor on the program or by an engineer at the Air Force Laboratories participating in the program. There were 92 graduate students selected for the 1985 program.

Again in the 1986 program, the graduate students were selected on their own merits, and assigned to be supervised by either a professor on the program or by an engineer at the participating Air Force Laboratory. There were 100 graduate students selected for the 1986 program.

Follow-on research opportunities have been developed for a large percentage of the participants in the Summer Faculty Research Program in 1979-1983 period through an AFOSR Minigrant Program.

On 1 September 1983, AFOSR replaced the Minigrant Program with a new Research Initiation Program. The Research Initiation Program provides follow-on research awards to home institutions of SFRP participants. Awards were made to approximately 50 researchers in 1983. The awards were for a maximum of $12,000 and a duration of one year or less. Substantial cost sharing by the schools contributes significantly to the value of the Research Initiation Program. In 1984 there were approximately 80 Research Initiation awards.

For the 1985 program, the amount of the Research Initiation Program was increased to a maximum of $20,000. Cost sharing by the Universities for the program was encouraged. There were 82 Research Initiation awards following the 1985 Summer Program. There will be approximately 80 Research Initiation Program awards following the 1986 Summer Program.

II. RECRUITING AND SELECTION

The program is conducted on a nationally advertised and competitive selection basis. Advertising for the 1986 program was conducted via direct mail to all accredited schools. The mailing was sent to the department chairman at the schools. The departments included biology, genetics, ecology, entomology, chemistry, computer science, graphics, mathematics, physics, aeronautical engineering, ceramic engineering, chemical engineering, materials science, mechanical engineering, electrical engineering, metalurgy, nuclear science, and psychology. The brochures were also mailed to all of the participants in the 1985 program. Brochures were mailed to the Presidents of Historically Black Colleges. The brochures were sent to all participating USAF laboratories/centers; distribution was made through AFROTC units on university campuses; information was supplied to all who made requests. Overall, more than 9000 brochures were distributed throughout the country.

In 1979, 70 faculty members participated. In 1980 and 1981, 87 faculty members participated each year; 91 faculty and 17 students participated in the 1982 program. In 1983, 101 faculty and 53 students participated. In the 1984 program there were 152 faculty members and 84 graduate students appointed to the Air Force facilities. For the 1985 program, 154 faculty members and 92 graduate students were assigned to the Air Force laboratory/centers. In 1986, 158 faculty and 100 graduate students participated.

Application deadline was February 1, 1986. There were over four (4) applications received for each position available on the 1986 Summer Faculty Research Program. The selection panels met in February. The announcements of selections were mailed on March 1, 1986. In total 184 offers of position were made for the Summer Faculty Research Program, with 158 professors accepting appointments.

III. PRE-SUMMER VISIT (Optional)

Each Summer Fellow was directed to contact the designated representative at the laboratory/center of assignment to discuss a pre-summer visit. The purpose of the pre-summer visit is basically threefold: 1) to meet with laboratory personnel, especially the Effort Focal Point with whom the Summer Fellow would be working most closely, and to become personally acquainted with the laboratory facilities; 2) to finalize and formalize objectives for the Summer Fellow's summer research period and report these to UES; 3) to make arrangements for lodging for the research period. The focus of this visit was on making sufficient preparations so that the ten week summer research effort would be effective.

IV. GRADUATE STUDENT SUMMER SUPPORT PROGRAM (GSSSP)

A pilot program for Graduate Student Summer Research via the AFOSR Summer Faculty Research Program (SFRP) was initiated by contract modification on 26 March 1982. The program was developed as an adjunct effort to the SFRP. Its purpose is to provide funds for selected graduate students to work at appropriate Air Force laboratories or centers with supervising professors who hold concurrent SFRP appointments. During the 1984 program, 84 graduate students representing 42 schools and 20 disciplines were appointed from 112 applicants.

Starting with the 1985 GSSSP, emphasis was placed on selecting graduate students to be placed with either supervising professors on the SFRP or with the Air Force laboratory/center engineers. There were 120 GSSSP applicants. A total of 92 graduate students were selected to participate in the 1985 program.

In 1986, there were 163 GSSSP applicants. A total of 100 graduate students were appointed, representing 30 disciplines, 57 schools, and 32 states.

The 1986 GSSSP report is published as three separate documents under the 1986 Summer Faculty Research Program and are entitled, Graduate Student Summer Support Program Management Report and Technical Reports, Volume I and II, October 1986.

V. SITE VISITS

Visits listed below include those by UES and AFOSR personnel. The faculty, USAF research colleagues, and student participants are generally satisfied with the program. Criticisms were: a) too much paper work to administor program, b) housing difficult to find, c) delays experienced in receiving payment d) 10 weeks too short for research period.

June 10, 1986	Rome Air Development Center Griffis Air Force Base, New York
June 11, 1986	Wright-Patterson Air Force Base Dayton, Ohio
June 24, 1986	Electronics Systems Division Geophysics Laboratory Hanscom Air Force Base, Massachusetts
July 10, 1986	Logistics Management Center Gunter AFS, Alabama
July 11, 1986	Arnold Engineering Development Center Arnold Air Force Station, Tennessee

July 18, 1986	School of Aerospace Medicine HRL: Training Systems Division HRL: Manpower and Personnel Division Occupation and Environment Health Laboratory Brooks Air Force Base, Texas
July 21, 1986	Engineering and Services Center Tyndall Air Force Base, Florida
July 22, 1986	Armament Laboratory Eglin Air Force Base, Florida
July 24, 1986	Wright-Patterson Air Force Base Dayton, Ohio
July 28, 1986	Rocket Propulsion Laboratory Edwards Air Force Base, California
July 30, 1986	HRL: Operations Training Division Williams Air Force Base, Arizona
July 31, 1986	Weapons Laboratory Kirtland Air Force Base, New Mexico
Aug. 1, 1986	Frank J. Seiler Research Laboratory United States Air Force Academy, Colorado

Because of the proximity of UES to Wright-Patterson Air Force Base, several site visits were made to the following laboratories:

Aerospace Medical Research Laboratory
Aero Propulsion Laboratory
Avionics Laboratory
Business Research Management Center
Flight Dynamics Laboratory
Human Resources Laboratory
Logistics Command
Materials Laboratory
Wright-Patterson Air Force Base, Ohio

We find that the objectives of the SFRP are being well served. SFRP Research Fellows indicate that they are performing independent research, and are not being used as "summer help". There are some misconceptions by research colleagues and summer fellows concerning the purpose of the program; one misconception is that the program is suitable for repeated research efforts by an individual. However, in this program we have found no abuse of the non-personal services requirements. As expected, enthusiasm is high for the possibilities of follow-on funding by AFOSR at the home university. Research fellows often conduct lectures and seminars at the Air Force locations.

As a record of the documentation supplied to the appointees, the UES Information and Appointment Packets are provided in Appendix I of this report.

VI. HISTORICALLY BLACK COLLEGES/UNIVERSITIES (HBCU's) WORKSHOP

In support of the Summer Faculty Research Program, and as part of the UES EEO/Affirmative Action Program, UES sponsored an information booth at the NAFEO (National Association for Equal Opportunity in Higher Education) Conference. The conference was held on April 6 through April 11, 1986. UES provided information on the UES-AFOSR summer programs at this conference.

VII. AMD SCHOLAR PROGRAM

As part of the Special Studies section of the Summer Faculty Research Program, UES initiated a Scholar Program for the Aerospace Medical Division.

The USAF AMD Scholar Program was sponsored by the Air Force Aerospace Medical Division through the Air Force Office of Scientific Research (AFOSR) and conducted by Universal Energy Systems, Inc. (UES). It provides research opportunities for qualified Engineers and Scientists who have received their Ph.D. degrees, or equivalents, from technical programs at U.S. Universities or Technical Institutions. These opportunities consist of one year research appointments with the Aerospace Medical Division with laboratories located at

Brooks AFB (San Antonio) Texas
Wright-Patterson AFB (Dayton) Ohio

This pilot program is an adjunct to the AFOSR Summer Faculty Research Program (SFRP).

APPLICATION DEADLINE: February 28, 1986

Selection Notification by 15 April 1986

OVERVIEW

The Air Force Office of Scientific Research, the Air Force Aerospace Medical Research Division, and Universal Energy Systems, Inc., initiated a pilot Air Force AMD Scholar Research program beginning in the Fall of 1985. This new program was an adjunct effort to the U.S. Air Force Summer Faculty Research Program (SFRP). This pilot program provided research opportunities for selected Engineers and Scientists holding a doctoral degree to work with the Air Force Aerospace Medical Division for a one year research period at one of the laboratories under the Aerospace Medical Division.

To be eligible, candidates must have a Ph.D. or equivalent in an appropriate technical field. The scholars were selected from such fields as Human Perception, Human Performance, Biochemistry, Toxicokinetics, Artificial Intelligence, and Neurosciences. The applicants were U.S. citizens, holding an appropriate advanced graduate research degree.

The Air Force Scholar in this program has the following specific obligations:

1) To participate in advanced research programs at the appropriate Air Force Aerospace Medical Division Laboratory.

2) To prepare a report at the end of the one year appointment describing their research accomplishments. This report will be approved by the Air Force Aerospace Medical Division.

3) To complete an evaluation questionnaire on the Air Force Aerospace Medical Division Scholar Research Program.

PROGRAM OBJECTIVES;

(1) To provide a productive means for Scientists and Engineers holding Ph.D. degrees to participate in research at the Air Force Aerospace Medical Division Laboratories;

(2) To stimulate continuing professional association among the scholars and their professional peers in the Air Force;

(3) To further the research objectives of the United States Air Force; and

(4) To enhance the research productivity and capabilities of Scientists and Engineers especially as these relate to Air Force technical interests.

PREREQUISITIES FOR APPOINTMENTS: To be qualified for consideration as an AMD Scholar in the Fall 1985 program, the applicant must:

(1) be a U.S. Citizen;

(2) be the holder of a Ph.D. degree, or equivalent, in an appropriate technical specialty; and

(3) be willing to pursue research work of limited time duration at the Air Force AMD Laboratories.

Although it is anticipated that the research itself may be unclassified, the Scholar must hold or be eligible for a Department of Defense SECRET clearance in order to insure access to work areas.

RESEARCH PERIOD: The period of this appointment is for one year starting in the summer of 1986, with a possible one-year extension.

FINANCIAL TERMS: The stipend for the Air Force AMD Scholar in this program is as follows:

One year research effort compensation of $34,000.

Travel expenses will be reimbursed for one trip from the Scholar's normal location to the Air Force facility at the start of the appointment; and one return trip from the Laboratory to the Scholar's normal home base at the end of the appointment period. This travel will be reimbursed in accordance with Universal Energy Systems, Inc. travel policy.

RESEARCH LOCATION: For the efforts contemplated, the AMD Scholars will be located at one of the following locations:

Air Force Human Resources Laboratory at Brooks AFB (San Antonio) TX

USAF School of Aerospace Medicine at Brooks AFB (San Antonio) TX

Harry G. Armstrong Aerospace Medical Research Laboratory at Wright-Patterson AFB (Dayton) Ohio

TECHNICAL PROGRAM TOPICS

There are many technical areas for study which fall within the purview of the Air Force Aerospace Medical Division (AMD). The research and development responsibility of AMD is to effectively integrate the human operator within the wide spectrum of Air Force systems and missions. These "human-centered" efforts span the full spectrum of research and development ranging from basic research through engineering development and are conducted via contract or within unique in-house facilities which allow real world Air Force environments to be simulated in the laboratory setting with the human operator as the central focus.

A list of technical tasks of present interest for scholarly research are noted below. These areas are planned or currently active with high priority, and provide an indication of the breadth and scope of the laboratory activity of interest for this program.

(1) Human Perception and Performance
   a. Visual perceptual and information requirements of humans
   b. Motion perceptual and information requirements of humans
   c. Performance and active control capabilities
   d. Psychophysical assessment of visual cues
   e. Visually risky environments encountered by pilots

(2) Biochemistry and Toxicokinetics
  a. Epigenetic mechanisms of chemical carcinogenesis
  b. Physiological uptake models for skin and gut

(3) Artificial Intelligence
  a. Integrated expert system for training and job-aiding
  b. Intelligent computer-assisted instruction
  c. Intelligent coaching systems
  d. Computational linquistics
  e. Cognitive processes

(4) Neurosciences
  a. Neurophysiology - auditory, vestibular, or visual functions
  b. Neurochemistry-neurotransmitter interactions
  c. Biomedical Engineering - visual and vestibular oculomotor functions
  d. Biophysics - IR pumping of vibrational states of Opsin.

AIR FORCE AEROSPACE MEDICAL DIVISION
ORGANIZATION OVERVIEW

There are three Air Force Aerospace Medical Division organizations participating under this program. These are:

Harry G. Armstrong Aerospace Medical Research Laboratory (AAMRL) at Wright-Patterson AFB (Dayton) Ohio

Air Force Human Resources Laboratory at Brooks AFB (San Antonio) Texas

United States Air Force School of Aerospace Medicine (USAFSAM) at Brooks AFB (San Antonio) Texas

A brief overview of the activities and responsibilities of the organizations follows. This discussion illustrates the breadth and scope of technical work in the organization.

AEROSPACE MEDICAL DIVISION (AMD)

Background Information

The Aerospace Medical Division (AMD), headquartered at Brooks AFB Texas, is a major Air Force Systems Command (AFSC) organization composed of several diverse organizations with varying missions. These missions include operation of the Wilford Hall USAF Medical Center at Lackland AFB Texas, field consultation services through the Occupational and Environmental Health Laboratory (OEHL), Brooks AFB, conduct of specialized biomedical education through the USAF School of Aerospace Medicine (USAFSAM), Brooks AFB, and research and development. All research and development programs are the responsibility of the AMD Deputy Commander for Research, Development and Acquisition and are managed through the USAF School of Aerospace Medicine (USAFSAM), the

Harry G. Armstrong Aerospace Medical Research Laboratory (AAMRL) at Wright-Patterson AFB Ohio, the Air Force Human Resources Laboratory (AFHRL) headquartered at Brooks AFB, and the AMD Directorate of Systems Acquisition (AMD/RDS) also at Brooks AFB.

The research and development responsibility of AMD is to effectively integrate the human operator within the wide spectrum of Air Force systems and missions. These "human-centered" efforts span the full spectrum of research and development ranging from basic research through engineering development and are conducted via contract or within unique in-house facilities which allow real world Air Force environments to be simulated in the laboratory setting with the human operator as the central focus.

1) <u>HARRY G. ARMSTRONG AEROSPACE MEDICAL RESEARCH LABORATORY (AAMRL)</u>

The Armstrong Aerospace Medical Research Laboratory's mission is to conduct behavioral and biomedical research to define the limits of human tolerance and the degradation of human performance under the conditions of environmental stress associated with aerospace operations. Results of these scientific efforts are published as technical reports, articles in scientific journals, handbooks, military specifications, and occasionally as scientific textbooks or chapters in academic textbooks. Further responsibility lies in establishing design criteria and new biotechnology techniques for future aerospace systems to protect and sustain personnel in any conceivable Air Force operational situation. The Laboratory also provides technical assistance to other federal agencies consistent with Air Force mission requirements and availability of resources.

To provide the most efficient operating structure, AAMRL is organized into five divisions. The three research divisions - Biodynamics and Bioengineering, Human Engineering, and Toxic Hazards - make major contributions to the AMD Biotechnology Program. The other two divisions - Veterinary Sciences and Technical Services - perform diverse support activities in animal care, their proper use and handling; administration, maintenance and material, resource management, and plans and programs.

The Laboratory's collocation with the Aeronautical Systems Division (ASD), Air Force Wright Aeronautical Laboratories, Air Force Institute of Technology, and affiliation with the Wright State University Medical Program fosters close working relationships among the medical and research disciplines represented. The proximity of the Laboratory and the ASD System Program Offices allows close coordination to resolve mutual problems involving integration of biotechnology inputs to new aerospace systems.

a) HUMAN ENGINEERING DIVISION (HE)

There is an increasing awareness that it is man's performance that distinguishes the mediocre system from the outstanding one - that distinguishes success from failure. Whether or not man's performance can meet the operational challenge depends to a large extent on the degree to which the system is designed to take maximum advantage of man's capabilities. The programs of the Human Engineering Division are aimed at learning more about man's physical and mental performance capabilities as an element in modern complex systems. The objective is to provide information for design engineers to integrate man and his capabilities into the system in a manner that will maximize total system effectiveness.

The Human Engineering Division is supported by a variety of complex special purpose facilities unique to the scientific community. To accomplish its mission of designing and quantifying performance of visual systems, an image metrics laboratory provides full capability for both the quantification of visual/display stimuli, as well as for measuring the human psychophysical response mechanisms. Research in the areas of decision-making, man-centered systems, systems simulation, and computer graphics is supported by a tailored digital computational/simulation system. In addition, the program to enhance operator performance in strategic offensive and defensive systems has required the development of special-purpose simulators that permit complete mission simulation for the B-52G/H strategic aircraft defensive and offensive systems crews. Other significant research tools include a variety of simulators: the roll axis tracking simulator (RATS), capable of rotation and oscillation about the longitudinal axis of its gondola; multi-axis tracking simulator (MATS), capable of motion in the roll and yaw axis, combined with motion along a horizontal, circular track; the manned threat quantification (MTQ) simulator, which functionally duplicates the performance of selected threat anti aircraft systems; and a sophisticated television tracking simulator.

b) TOXIC HAZARDS DIVISION (TH)

The Toxic Hazards Division has the sole responsibility within the Air Force to identify and quantitate toxic hazards created by chemical environments characteristic of advanced Air Force systems and operational situations. The ultimate purpose of the research program is to provide valid medical guidelines for the prevention of and protection against such health hazards as may be encountered by Air Force personnel in the performance of their military duties.

To understand and properly evaluate the health hazards peculiar to a certain chemical compound, its pharmacological properties and the pathways of metabolism, absorption, distribution and excretion must be investigated, the type and magnitude of pathology must be established, and diagnostic and therapeutic methodology must be developed. Based on these parameters, tolerance criteria can be recommended for personnel who handle or are otherwise in contact with such compounds.

The Toxic Hazards Division includes a nationally recognized capability for inhalation toxicology centered around eight unique exposure chambers called Thomas Domes. These domes are large glass-paneled structures, 12 feet in diameter and 9 feet high, which permit unrestricted visual and photographic observation of experiments in progress. The domes have an altitude capability and are air-locked to permit entry during long, continuous exposures without disturbing the exposure parameters. These design features make them excellently suited for handling highly toxic and suspect carcinogenic chemicals. The exposure facility includes numerous other commercial chambers and has associated with it a hands-off gas mixing facility used to generate and maintain precise concentration levels of hazardous materials common to the missile industry.

2) <u>AIR FORCE HUMAN RESOURCES LABORATORY (AFHRL)</u>

The Air Force Human Resources Laboratory is the principal AFSC organization charged with planning and executing the USAF exploratory and advanced development programs for research related to manpower and personnel, manned aircraft simulation, logistics, and technical training. Manpower and personnel research addresses selection, classification, assignment, evaluation, and retention of Air Force members and overall force structure and utilization. Manned aircraft simulation includes training technology for simulators and other instructional devices, the development of devices and technology for training air combat tactics, and advanced systems to improve the quality and combat effectiveness of aircrews. Logistics research studies logistics factors at each step in the development and acquisition of systems and the productivity of maintenance personnel in operational environments. Technical training addresses the development of improved methods for training including content, instructional strategies, delivery, and management.

a) <u>TRAINING SYSTEMS DIVISION (ID)</u>

The Training Systems Division is developing technology to guide in the design and acquisition of computer-based training management and delivery systems applicable to both "schoolhouse" and "on-the job" training. At more fundamental levels, it is developing technology for relevant skill and performance specifications, as well as for technology for applications of artificial intelligence in technical and maintenance training and performance.

The program involves major projects on standardized computer-based-instruction (CBI) software and maintenance simulation for training. The CBI software efforts are joined into a joint-Services R&D project with the common goal of providing a library of transportable, user-friendly, menu-driven, machine-independent, modularized, course-authoring CBI software, in Ada, for use by all the military Services. This effort also has numerous technology-transition projects. The maintenance simulation efforts are developing technical reports and guides or specifications for the design, acquisition, and use of maintenance simulators for training. Three additional areas within the project are in their formative stages. Specifically, these are (a) Integrated Training System, (b) Manpower, Personnel, and Training Integration Technology, and (c) Application of Artificial Intelligence to Air Force Training efforts.

3) USAF SCHOOL OF AEROSPACE MEDICINE (USAFSAM)

The USAF School of Aerospace Medicine has the responsibility to support and enhance Air Force Capabilities and Operations through programs across the spectrum of aerospace medicine, education, and research and development. This mission is accomplished by conducting postgraduate education programs in clinical medicine, aerospace medicine and related fields, preventive medicine, and technical education in support of the United States Air Force mission objectives.

The School also provides medical evaluation and consultation services for flying personnel with difficult, obscure, or borderline medical problems that affect their flying status. Operational support is provided to Air Force commands and other Government agencies within the scope of on going research and development, education, and medical evaluation and consultation programs.

The USAFSAM research and development program involves the areas of: (1) Aerospace Medicine encompassing aircrew maintenance, selection, and retention criteria; risk factor identification/modification; and aeromedical data bases. (2) Radiation Hazards in Aerospace Operations which includes acute and chronic radio frequency radiation (RFR) exposure bioeffects; laser effects on AF personnel; performance effects of particulate radiation exposure; and nuclear aircrew vulnerability. (3) Advanced Crew Technology incorporating aircrew stress and fatigue investigations and in-flight assessment of the cockpit environment; development of advanced tactical aircraft; and development of crew protective equipment (altitude and thermal); and (4) Aerospace Biotechnology for Chemical Warfare Defense which includes individual protection; detection and warning; laboratory and field testing of equipment or techniques; and medical equipment development.

a) CLINICAL SCIENCES DIVISION (NG)

Modern high-performance aircraft pose new and challenging problems with regard to the man-machine interface in the aerospace environment and man's ability to function properly regardless of visual or other medical stimuli encountered. The Clinical Sciences Division is involved in evaluating and solving these problems from four different perspectives: (1) Aeromedical evaluation through the USAF Aeromedical Consultation Service to ensure the selection of the right person for the right job, thus preserving the integrity of the present and future Air Force flying force. (2) Direct and indirect input of aeromedical problems and their solution into the education and training of flight surgeons who will be performing health maintenance for rated personnel in the field. (3) Performance of aeromedical research directed toward solving or modifying medical problems encountered in Air Force flyers, thus preserving the investment of the Air Force in the rated force.

(4) Provision of aeromedical support to the field by responding to requests for information from flight surgeons at Air Force bases and organizations throughout the world; by the serial comparison of electrocardiograms obtained on rated crewmembers; and by assisting in the refining of medical standards for selection and retention for flying training.

AMD PROGRAM SUMMARY

UES prepared a brochure describing the AMD Scholar program and application forms. Approximately 5000 of these were mailed to the Colleges and Universities throughout the United States. The brochure was provided to the participating AMD Laboratories for distribution. A total of 14 applications were received. Six offers of position were made. Three were accepted. There are currently 3 participants on the program. The technical effort is scheduled to be completed by January 1988.

VIII. HIGH SCHOOL APPRENTICESHIP PROGRAM (HSAP)

As part of the Special Studies section of the Summer Faculty Research Program, UES initiated an Air Force High School Apprenticeship Program. The purpose of the program was to place highly qualified and highly motivated high school students in the Air Force Laboratories for orientation and training in science and engineering. UES provided the recruiting, selection, and management to start up the Air Force HSAP. Much of the program development was based on the successful Army High School Program and material prepared under the contract to the Department of the Army by the National Institute for Work and Learning. To accomplish this effort, UES followed the schedule presented in Table 1.

TABLE 1
AIR FORCE HIGH SCHOOL
APPRENTICESHIP PROGRAM

Calendar of Activities

December	o	Identify schools and laboratories for participation
	o	Prepare informational material for schools and installations application forms for students and mentors, and covering letters.
	o	Disseminate information
	o	Recruit apprentices, mentors
January	o	Send student applications to teachers
February	o	Applications with teacher recommendations
	o	Receive mentors' project descriptions and student requirements
	o	Make preliminary selection of students for referral to mentor
March	o	Make preliminary matching of students with mentors; send letters with several student applications to each mentor
	o	Mentors interview students, inform UES of choice
April	o	Send letters of placement to students, with acceptance forms to be signed by them and parents and returned to UES
	o	Place 2nd year apprentices (Eglin and Hanscom only)
	o	Make final matches
	o	See that security clearances are started, where applicable
	o	(Mentors provide background reference material to chosen apprentices)
	o	Encourage enrichment activities: arrange for films, speakers, tours, ect.
May	o	Send letters to students and mentors re-opening session
	o	Send students Apprentice Handbook
June	o	Arrange general orientation for students and mentors
July, August	o	Administer and monitor apprenticeships
	o	Check on enrichment activities
	o	Distribute evaluation forms to students and mentors
September	o	Analyze evaluations
	o	Prepare final report to Air Force

In the near future the United States may face shortages of scientists and engineers in such fields as physics, electronic engineering, computer science, and aeronautical engineering. High school students are currently not selecting to prepare for careers in these areas in numbers large enough to match the projected need in the United States.

The Air Force faces "a formidable challenge - the acquisition and retention of the technological competence needed to ensure a strong national security, both in-house and in the industrial and academic base which supports defense preparedness." The Director of the Office and Science of Technology Policy in the Executive Office of the President in 1979 responded to this need by requesting the federal agencies to incorporate in their contract research programs the mechanisms to stimulate career interests in science and technology in high school students showing promise in these areas. The Air Force High School Apprenticeship Program is an example of the response to this.

Under this program, UES placed the selected high school students in a wide variety of scientific and engineering fields at the participating Air Force Laboratories/centers. The students worked for an eight-week period during their summer vacations. UES provided all the support and administration to advertise the program, coordinate applications with the Air Force Laboratory mentors, made final selection of student-mentor matches for the summer, made payment to the students during their working period, and collected and coordinated the final reports from the students.

The Laboratories participating in the program, along with the number of high school students assigned to the laboratory is listed below.

Laboratory	Students
Armament Laboratory Fort Walton Beach, Florida	11
Armstrong Aerospace Medical Research Laboratory Dayton, Ohio	3
Engineering and Services Center Panama City, Florida	10
Frank J. Seiler Research Laboratory Colorado Springs, Colorado	2
Geophysics Laboratory Boston, Massachusetts	8
Rome Air Development Center Rome, New York	5
School of Aerospace Medicine San Antonio, Texas	2

There were a total of 41 participants in the program selected from 232 High School student applicants. The final report on the High School Apprenticeship Program is published under a separate report entitled <u>United States Air Force High School Apprenticeship Program 1986 Program Management Report</u>.

APPENDIX I

This appendix presents the following documents which were distributed to appointees and other program participants.

A. Information Brochure for Summer Fellows.

B. Questionnaire for participants and a summary of their replies.

C. Questionnaire for Air Force laboratory representative and a summary of their responses.

D. Questionnaire for participants research colleagues and a summary of their replies.

APPENDIX 1.A

INFORMAION BROCHURE

for

SUMMER FELLOWS

on the

1986 USAF-UES SUMMER FACULTY RESEARCH PROGRAM

March 1986

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I. SUMMER FELLOW OBLIGATIONS

Universal Energy Systems, Inc. (UES) is required by contract to impose certain obligations on you in your status as a Summer Fellow. This section outlines those obligations, and you should read them thoroughly. Your are required to sign and return the statement of understanding before the final processing of your appointment can be completed. The following is a list.

1. Pre-Summer Visit: A pre-summer visit to your research location is optional but has been of great value to previous participants in planning the summer research effort. Approval for such a trip may be granted upon written request to UES along with the concurrence of the Laboratory/Center respresentative. The purpose of this visit is to enable you to make your final plans for the summer research period if needed. Reimbursement is paid for allowable travel expenses incurred on a pre-summer trip as indicated in the Allowable Travel Expenses section of this brochure. To be reimbursed, you must invoice for it as described in the Instructions for Invoicing for Compensation and Reimbursement section (page 5) of this brochure.

2. Research Goals and Objectives: A statement of research objectives must be provided to UES PRIOR TO the start of the summer research period. You should outline your goals and the approach you intend to follow in researching these goals. Neither travel expenses nor expense allowances will be reimbursed until after receipt of your statement of research objectives. The report should also clearly indicate the date of your first working day of the summer research period.

3. Final Report: At the end of your summer research effort, you are required to submit to UES a completed, typewritten scientific report stating the objectives of the research effort, the approach taken, results, and recommendations. Information on the required report format will be sent to you with a "FINAL REPORT INFORMATION BULLETIN" and sample report illustrating a suggested format. The final report must first be approved by your Effort Focal Point and then transmitted so as to reach UES by Tuesday, September 30, 1986. Payment of "Compensation" for the final two weeks of your ten-week research period cannot be made until UES has received and approved this report in the required format.

4. Program Evaluation Questionnaire: This critique form should be completed and returned to UES, along with your final report, by Tuesday, September 30, 1986. The return of this form is a program requirement; it also must be received by UES before the final compensation payment can be made.

5. U.S. Air Force - Summer Fellow Relationship: The U.S. Air Force and UES understand and agree that the services to be delivered by Summer Fellows under this contract will be non-personal services and the parties recognize and agree that no employer-employee or master-servant relationships will exist between the U.S. Air Force and the Summer Fellows. Non-personal services are defined as work performed by an individual who is responsible for an end item, such as a report, free of supervision of the U.S. Air Force and free of an employer-employee relationship.

As a Summer Fellow, you will not:

(a) Be placed in a position where you are appointed or employed by a Federal Officer or are under the supervision, direction, or evaluation of a Federal Officer, military or civilian.

(b) Be placed in a staff or policy-making position.

(c) Be placed in a position of command, supervision, administration, or control over Air Force military or civilian personnel or personnel of other contractors or become a part of the U.S. Air Force organization.

The services to be performed under the SFRP do not require UES or the Summer Fellow to exercise personal judgement and discretion on behalf of the U.S. Air Force; rather, the Summer Fellows will act and exercise personal judgement and discretion on their research programs on the SFRP conducted by UES.

The Air Force will have unrestricted use of and access to all data developed during the period of this appointment.

II. ALLOWABLE TRAVEL EXPENSES

If you live outside of the area (50 miles) where you will be assigned for the summer program, the SFRP provides potential funding for two trips between your home and your assigned research location. As soon as you have signed and returned your appointment letter along with the budget sheet, you will be authorized to receive reimbursement for travel expenses as described below.

As outlined in the Summer Fellow Obligations section in this brochure, you may make a pre-summer visit in addition to the trip to and from your assigned research location for your summer effort. You are expected to make your own arrangements for these trips, and after the trips you may invoice UES for reimbursement of allowable expenses in the format described in the Instructions for Invoicing for Compensation and Reimbursement section of this brochure. Closely coordinate your travel plans with your EFFORT FOCAL POINT.

All travel reimbursements under Summer Fellow appointments are made according to current UES policy, and deviations from the approved budget are not authorized and will not be reimbursed. In light of these restrictions, you may choose either to travel by common carrier at coach rates or less, by driving your private auto, or by a combination of both. (Please note that funding for rental cars requires ADVANCED WRITTEN approval by UES and UES will not reimburse this expense unless the prior written approval is obtained.) With any of these choices you may claim reimbursement up to the amount for the most direct routing, taking into the account the desirability of routing on interstate highways if you drive your private auto.

Reimbursement for direct route travel by common carrier will be paid on your submission of an invoice to UES following the invoicing instructions referenced above. In the view of the convenience of having a car at the research location, UES strongly recommends that a private auto be used for travel when practical. Reimbursement when you drive your private auto is at the rate of 20¢ per mile within the above routing restrictions and will be paid on submission of a suitably prepared invoice. These reimbursements cannot be extended to cover travel by your family if they accompany you on either of these authorized trips.

During the pre-summer visit, you will be authorized to claim a per diem reimbursement at the rate of $53.00 per day for a maximum of three days spent at your assigned research location outside of your area of residence. Instructions for claiming this per diem are also described in the Instructions for Invoicing for Compensation and Reimbursement section of this brochure.

During the ten week summer research period, you will be authorized to receive an expense allowance in lieu of a per diem payment at a rate of $39 per day for a maximum of 70 days. To receive this allowance, you must invoice for it and be living (50 miles) outside your area of residence.

These items above are the only reimbursable travel allowances authorized under the SFRP appointment. Any additional travel expenses incurred during the appointment period will be your personal responsibility.

UES has arranged with a travel office in Dayton, Ohio, to have the Air Fare costs of your travel on the SFRP charged directly to UES. For you to take advantage of this you must call this travel service. The number in Dayton, Ohio, is 293-7444 or 1-800-628-6668. You must give the code SLI3 to have the tickets charged to UES.

III. INSTRUCTIONS FOR INVOICING FOR COMPENSATION AND REIMBURSEMENT

Attached is a copy of the Invoice Format that you are required to use to obtain compensation or reimbursement from UES. Note that all disbursements by UES for compensation, travel, and/or other expenses are subject to audit approval, so you must submit receipts substantiating charges invoiced.

In addition, you must prepare, sign, date and attach to each completed invoice a Brief Report of Effort

A. PREPARATION OF BRIEF REPORT OF EFFORT

Whenever you submit an Invoice for reimbursement to UES you must also include a brief report describing your activities for the invoice period. To meet this obligation, you must prepare, date, sign, and attach to your completed invoice a Brief Report of Effort describing the research accomplished on the appointment and explain any travel during the invoice period.

This report should describe innovative techniques and designs or discoveries which may be disclosed as patents. Rights to any inventions or discoveries shall reside with UES unless determined otherwise by the contracting agency.

The Brief report should never exceed one typewritten page and most often should be considerably shorter than one page.

B. PREPARATION OF INVOICE FORMAT

The financial items required on the Invoice Format are for COMPENSATION, TRAVEL, EXPENSE ALLOWANCE, AND PER DIEM.

Item (1) SOCIAL SECURITY/MAILING ADDRESS

Fill in your name, social security number, and address to which you wish to have your check mailed.

Item (2) COMPENSATION

(a) Indicate the dates for which you are claiming compensation, and indicate the number of days you are claiming for compensation.

(b) Multiply this number by $115.50 and enter the total dollar amount in the blank total charges for service. The accumulated total number of days you claim on this appointment may not exceed the number authorized in your appointment letter.

Item (3) TRAVEL

(a) Under the heading Date indicate the date you departed on your trip and the date you arrived at your destination. If you are invoicing for a round trip, also list the date you departed on your trip and the date you arrived home.

(b) Under the heading Dept/Arrival Time list the departure and arrival times for the corresponding days you listed under Date.

(c) List your destination under the heading Destination.

(d) Under the heading Mode, indicate your principal means of conveyance; i.e., commercial air, private auto, etc

(e) Under the heading Amount, itemized these expenditures for travel reimbursement. Continue them on a separate sheet if necessary.

(f) Total these travel items and enter the dollar amount for travel in this invoice on the line to the right of Total Travel Expense.

Item (4) EXPENSE ALLOWANCE

This item on the invoice will be used to claim the $39 per day for reimbursement of costs incurred at your assigned research location.

(a) In the first blank to the right of EXPENSE ALLOWANCE enter the number of days for which you are claiming the expense allowance at your assigned research location.

(b) Multiply this number by the daily allowance rate of $39.00 and enter this total dollar amount in the blank at the far right.

(c) Itemize the days for which you are claiming the Expense allowance reimbursement. It can include weekend days and holidays as well as regular work days. It does not apply to the pre-summer visit.

Item (5) PER DIEM

This item will be used to claim reimbursement only for Per diem charges on the optional pre-summer visit. This cannot exceed three days; only days spent at the actual research site are allowed.

(a) In the first blank to the right of PER DIEM enter the number of days reimbursement being requested. This entry must correlate with an accompanying lodging receipt.

(b) Multiply this number by the $53.00 daily Per diem rate and enter the total dollar amount in the blank at the far right.

Item (6) INSTRUCTIONS

You may combine reimbursement requests for compensation, travel, and Per diem or expense allowance in the same invoice. The total for all items invoiced should be indicated on the blank labeled "Total Amount of Bill" in the lower right hand side of line 6.

Item (7) If you have arranged your travel through the UES travel office, please indicate the cost of the tickets on this line.

IMPORTANT: Indicate in the space provide on each invoice the address to which you want the check mailed.

You must sign and date your invoice in the space provided as "Summer Fellow" before it is submitted; you MUST also have your Effort Focal Point countersign the invoice before it is mailed to UES Your Effort Focal Point is an Air Force individual at your research location who will be identified prior to your effort start date.

Invoices should be mailed to:

Universal Energy Systems, Inc.
SFRP Office
4401 Dayton-Xenia Road
Dayton, Ohio 45432

IV

BILL FOR SERVICE

1. ______________________________ ______________________
   Name (First, Initial, Last) Social Security #

   ____
   Address (Street, City, Zip)

   SERVICE: SFRP Summer Fellow

   SERVICE AUTHORIZED BY: *Rodney C. Darrah* RATE AUTHORIZED: $115.50/day

   This service is for:

   Government Contract: Project # 760
   Government Contract No. F49620-85-C-0013

2. DATES OF SERVICE: ____________ TOTAL DAYS OF SERVICE ______

   TOTAL CHARGES FOR SERVICE: ____________

   ADDITIONAL ITEMIZED REIMBURSABLE EXPENSES: (receipts required for expenditures over $25.00)

3. TRAVEL: DATE ____________ DEPT/ARRIVAL TIME ____________

   DESTINATION MODE ____________ AMOUNT ____________

4. EXPENSE ALLOWANCE: (________ days | $39.00/day) $________

5. PER DIEM: (______ days | $53.00/day) (Pre Summer Visit) $________

6. TOTAL AMOUNT OF BILL: ________________

7. AIR FARE TICKETS CHARGED DIRECTLY TO UES AMOUNT $__________

______________________________ ______________
Summer Fellow Signature - Date Telephone

Invoice Approval: ______________________________
Effort Focal Point Signature

X______________________________ Brief Report of Effort
Type or Print Name

Attached: ______________________

Location: ______________________

Telephone: ______________________

Date: ______________________

Send bill to:
UNIVERSAL ENERGY SYSTEMS, INC.
ATTN: SFRP Office
4401 Dayton-Xenia Road
Dayton, Ohio 45432

V
FOLLOW-ON RESEARCH POSSIBILITIES

As you are aware, the Air Force Office of Scientific Research sponsors the Summer Faculty Research Program. As a companion program intended to encourage further research work with the Air Force, AFOSR also sponsors the Research Initiation Grant Program. All Summer Fellows who have participated in the Summer Faculty Research Program are encouraged to apply for this valuable program. The Research Initiation Program is also administered by UES.

To compete for a Research Initiation Program award, SFRP participants must submit a complete proposal and proposed budget either during or promptly after their SFRP appointment period. The maximum award under the Research Initiation Program is $20,000 plus cost-sharing up to a matching total amount. The total funds available limit the number of awards to approximately 75, or half the number of 1985 SFRP participants.

The mechanics of applying for a Research Initiation Program award are as follows:

(1) Research Initiation Program proposals of $20,000 plus cost-sharing must be submitted after August 1, 1986 but no later than November 1, 1986. Proposals should be closely coordinated with the SFRP Effort Focal Point, relate to the SFRP effort and have strong prospects for later sustained funding by the Air Force Laboratory/Center.

(2) Proposals are evaluated and a final award decision is recommended by AFOSR after consultation with the Laboratory/Center.

(3) Awards will then be negotiated with the employing institution designating the individual as Principal Investigator, with the period of award having a start date no earlier than September 1, 1986 and a completion date no later than December 15, 1987.

(4) Employing institutions are encouraged to cost-share since the program is designed as a research initiation procedure. Budgets must include, where applicable, Principal Investigator time, graduate assistance and support effort, equipment and expendable supplies, travel and per diem cost, conference fees, indirect costs, and computer charges.

APPENDIX 1.B

PARTICIPANT'S QUESTIONNAIRE & REPLY SUMMARY

1986 USAF/UES SUMMER FACULTY RESEARCH PROGRAM
EVALUATION QUESTIONNAIRE

(TO BE COMPLETED BY PARTICIPANT)

Name_______________________________________Title____________________

Dept. (at Home)__________________________Home Institution_________________

Research Colleague____

Laboratory Address of Colleague____

Brief Title of Research Topic____
____

A. TECHNICAL ASPECTS

1. Was the offer of research assignment within your field of competency and/or interest? YES_____NO_____

2. Did you have a reasonable choice of research assignment? YES____ NO_____
If no, why?____

3. Was the work challenging? YES_____NO_____. If no, what would have made it so?____

4. Would you classify your summer effort as research? YES_____NO_____
Comment:____

5. Were your relations with your research colleague satisfactory from a technical point of view? YES_____NO_____ if no, why?__________________
____
____

6. Suggestions for improvement of relationship.____________________________
____
____

7. Considering the circumstances of a summer program, were you afforded adequate facilities and support? YES_____NO_____ If no, what did you need and why was it not provided?______________________________

____

8. Considering the calendar "window" of ten weeks, limited by various college and university schedules, please comment on the program length. Did you accomplish: more than______;
less than______;
about what you expected______?

9. Do you think that you will continue this or related research efforts upon returning to your home institution by applying for a Mini Grant or other funding? YES______NO______ Give a brief explanation of your plans.______________________________

____

10. Were you asked to present seminars on your basic expertise of work? YES______NO_____ Please list number, dates, approximate attendance, length of seminars, title of presentations.

11. Were you asked to participate in regular meetings in your laboratory? YES_____NO_____ If yes, approximately how often? __________

____

12. Did you perform travel on behalf of the laboratory? YES_____NO_____
Where to?____
Purpose?____

13. List any "special" meetings you may have attended or participated in, such as conferences, visiting lectures, etc.____________________

____

____

____

14. Other comments concerning any "extra" activities.__________________

____

____

15. On a scale of A to D, how would you rate this program?

	A (High)	. . .	.	D (Low)
Technically challenging	A	B	C	D
Future research opportunity	A	B	C	D
Professional association	A	B	C	D
Enhancement of my academic qualifications	A	B	C	D
Enhancement of my research qualifications	A	B	C	D
Overall value	A	B	C	D

B. ADMINISTRATIVE ASPECTS

1. How did you first hear of this program?________________________
____

2. What aspect of the program was the most decisive in causing you to apply?____
____

3. Considering the time of year that you were required to accept or reject the offer, did this timetable cause you any problems of commitment? YES_____NO_____

4. After your acceptance, was the information on housing, location, directions, etc. supplied to you prior to the summer period satisfactory? YES_____NO_____

5. Did you have any difficulty in any domestic aspects such as, locating suitable housing, acceptance in community, social life, any other "off-duty" aspects? YES_____NO_____ If yes, please explain._______
____
____

6. How do you rate the stipend level? Meager______Adequate____ Generous_____.

7. How important is the expense-paid pre-program visit to the work site? Not worth expense_____Convenient_____Essential_____. Please add any other comments you may have.______________________________

8. Please give information on housing: Did you reside in apartment_______, VOQ_______, other (specify)______________? Name and address of apartment complex and manager's name.______________________________

9. Please suggest names and give sources, of organizations, mailing lists or other information you think would be helpful in advertising next year's program.______________________________

10. Do you believe the Graduate Student Program increased the effectiveness of this program? YES_____NO_____.

11. Did a student work with you? YES_____NO_____ If so, please comment on the Graduate Student Support influence on your summer research.______________________________

12. Considering the many-faceted aspects of administration of a program of this magnitude, how do you rate the overall conduct of this program? Poor________Fair_______Good_______Excellent_______. Please add any additional comments.______________________________

13. Please comment on what, in your opinion, are:

a. Strong points of the program:______________________________

b. Weak points of the program:______________________________

14. On balance, do you feel this has been a fruitful, worthwhile, constructive experience? YES_____ NO______

15. Other remarks:____

____

____

____

____

____

____

THANK YOU

0450S/0019S

QUESTIONNAIRE EVALUATION SUMMARY
(Participant)

1. Assignment in field of competency and/or interest? Yes - 158
No -

2. Reasonable choice of assignment? Yes - 152
No - 6

If no, why?

This is difficult to answer. Given complete freedom of choice I would not have picked the topic that I did. The Atmospheric Prediction Branch has limited and well-defined goals, most of which, from my perspective, involve applications rather than research.

The offer was made to me entirely because of my unique background encompassing both physiology and engineering.

They had a specific task for me.

Optoelectronics project originally offered was abandoned.

But it was mutually agreed to before the assignment.

3. Work challenging? Yes - 157
No - 1

If no, why?

More freedom of choice in selection of the work project.

4. Would you classify your summer effort as research? Yes - 151
No - 7

Comments:

Yes

Literature search to experiments to statistical analysis to paper.

It was in many ways a preliminary to research, suggesting areas for research.

Applied research.

Excellent and challenging research environments.

It was a survey of capabilities.

Although it involved implementation of a rather standard sort of tool, it was preliminary to research.

Definitely; all criteria met (scientific approach, testing, verification, unduplicated findings, etc.).

Most definitely, each answered question raised 10 others.

Continuation of my own research.

Will lead to journal publication.

Development and testing of an assay system not previously used falls into the category of research.

It led me to think of more challenging research problems.

The Wind Tunnel work was not.

The literature is just beginning to present reports of applications to spectroscopy of interest to chemists.

The results will be presented at a conference and may yield a publishable paper.

Marginally - not enough time for more than surface results.

Turbine exhaust sampler alone would have been research combustion products of pure alophutica are really a frontier.

Primarily library (literature) research (searching, analyzing, interpreting) then reporting and discussing with colleagues relevant to problems at hand. It was different from traditional bench-top research.

Half of the summer was spent doing research and the other half working to developing a research proposal for continuation of the research at Morehouse College. This is the second appointment for the above summer faculty research fellow at Brooks.

<u>No</u>

It was project related - not a basic research.

It's the age-old problem that the Air Force needs short term results while university people think in terms of the big picture down the road.

Mostly calibration of an instrument. But did do modelling of phosphor which is research.

Although now the program is written, the research is starting on another phase.

Several topics were not; but were quickly completed.

Summer work was development oriented, the follow up work does contain topic for open research.

Development.

5. Were your relations with colleagues satisfactory? Yes - 155
No - 3

If no, why?

We never really discussed technical matters. He took a mostly supervisory role and was busy developing other projects. Technical matters were discussed with Mr. Murray Daniels, Strategic Planning Division, MITRE Corp.

He did not limit the problem to a 10 week domain.

Discussions were too infrequent and then mostly with a belated sense that some effort was made in unproductive directions.

6. Suggestions for improvement of relationships.

More information interchange as soon as possible.

List the specific research topics in each lab and personnel topic. It would help to match researcher's interests with the lab - at the time of applying.

It may help to let the researchers brief other members of the group on a more formal basis.

HRL needs to have a better organized procedure for orienting summer people of their facilities and operations. Need to provide more exposure of their research efforts.

Prefer a mature colleague compatible in qualifications and experience - has more freedom and authority for decision making - accessibility for facility and freedom to arrange conferences, etc.

Relationship was excellent.

Couldn't be better.

Clear documentation of HRL division research effort. Historical documentation of BAT, Data Bank is lacking.

Make sure lab personnel have sufficient time free to collaborate.

I would be pleased to continue our relationship.

Do not "assign" scholars to be supervised by young, inexperienced Lieutenants, require supervisors (research colleague) to attend the briefing on the SFRP given by the AFOSR people, and the effort focal point and the research colleague should be the same individual.

Minimize political concerns.

He didn't have enough time to get involved much. He should have a technical assistant to handle hardware and software details.

I wish that I could have received in advance the progress reports on this project which covered previous work by the group.

More available time but most people are so busy they do not have any more time.

Original SFRP brochure suggest greater opportunity to work in area of interest than actually existed. Perhaps need to insure fidelity of descriptive "advertising".

My relationship with my research colleague and other members of the branch was very satisfactory.

The relationship could not have been improved.

More open communication, including: discussion of principles involved; identification of tasks to be done; assessment of intermediate results so that snags or wrong directions can be identified.

More interaction and discussion would have been very helpful to me in understanding the overall goals of the group and specific aspects of my topic.

The relationship at Aerospace Research was very good and Colonel John Touhey was extremely helpful and very nice.

There did not seem to be enough time to talk in depth on a research topic.

I do not feel that my situation could have been improved on.

None, the personnel at AFRPL were all very helpful.

Dr. Speakman left the lab after 8 weeks. In retrospect, I should have spent more time with Dr. Cloutier.

Prefer a mature colleague compatible in qualifications and experience - has more freedom and authority for decision making - accessibility for facility and freedom to arrange conferences, etc.

Very few - he has been extremely helpful and supportive and interested in the project - his guidance is exceptional, and extremely clear and precise.

Capt. Miller was too busy with administrative duties. It would have been more beneficial if he spent more time with me.

Was fine, steadily employed G.S. people are probably better colleagues than transient Air Force personnel.

Relationship was very good.

More organizational meetings with personnel on base in my particular area.

I had excellent relations, so I have no suggestions.

Relationship was excellent.

Support was excellent.

Greater speed and flexibility in ordering materials.

I think that participation by participant in general staff meetings of the unit would make the relationship even better which would be comparable to attendance at staff and/or faculty meetings at the college or university.

My relationship with Dr. Greenamyer was good. We hope to keep the lines of communication open and I hope she can serve as a consultant for the biochemistry aspects of any proposal funded through Morehouse College.

7. <u>Were you afforded adequate facilities?</u> Yes - 147
No - 11

<u>If no, why?</u>

The facilities were poor. The air conditioning didn't work and there was little secretarial support. We brought in our own fan and word processor.

A microcomputer which was expected prior to the summer had not been delivered in time to be used as anticipated in this research effort.

Lack of tech library support of to promptly perform computerized literature search.

Computer time on VAX 11/780 -An NRC fellow felt that he had more priority and used the majority of the time available.

Micro computers are unavailable.

I don't expect the world, but I did need desk space and a quiet place to work. ESD/XR had no spare space at all, and should have planned ahead on this.

There was a shortage of technical/secretarial assistants over the whole LMC.

We were told that we could not use such tools as the Xerox machine. This was quite petty.

My literature search required trips to Tallahassee for which I could not be reimbursed.

There is no personal computer available for my computing and word processing needs. The office space was provided in the rather noisy laboratory.

Travel would have greatly enhanced the C_2 understanding.

8. Accomplishment in ten weeks?
   More than expected - 23
   Less than expected - 16
   About what expected - 109

9. Will you continue this or related research efforts?
   Yes - 151
   No - 7

10. Were you asked to present seminars?
    Yes - 90
    No - 68

11. Were you asked to participate in meetings?
    Yes - 83
    No - 75

12. Did you travel on behalf of the laboratory?
    Yes - 31
    No - 127

13. Did you participate in "special" meetings?
    Yes - 59
    No - 98

14. Please give other comments on extra activities.

Was invited to the picnic.

Many opportunities were available.

Outside Aero Propulsion Laboratory, I have also interacted with researchers at Materials Laboratory and Flight Dynamics Laboratory, all located at WPAFB.

Some of my time was devoted to organizing the 12 ASME Design Automation Conference, scheduled for Oct. 5-8, in Columbus, OH. AEDC graciously allowed me access to the long distance phone lines for this purpose.

I feel that HRL did not do enough to expose summer professors to the research efforts, operations and research techniques. We expected more effort on their part.

Went on "tour" of the center.

Conference with scientists/professors-AFIT, AFWAL, Flight Dynamics, Information Services, SIMSTAR, CRAY-1, AI Lab, Materals Lab, AMRL, etc. - potential invitations on sabatical/1 year to teach/research at AFIT.

Would have liked to have travelled to Santa Fe to attend Nuclear Arms Conference.

Major Thomas Dale gave an introduction to Frank J. Seiler Research Laboratory. There was a tour to the research facilities.

The opportunity to participate in a navigator flight and to fly the T-38 simulator at Randolph AFB was very interesting and helpful to my understanding.

Tournament.

Will attend special on-base seminar Sept. 9, 10, 11, 1986.

I was regularly included in social events and made to feel like a regular member of AFGL.

The activities were helpful; it would have been good to have more.

They had some nice barbeques at lunch and after work.

I was able to visit relevant facilities at Wright State and at University of Dayton. This was of great benefit to me.

I wanted very much to visit other labs at Hanscom. But I was "watchdogged" and made to feel uncomfortable about how I was spending my time. On two occasions I was given direct orders as to how I was expected to spend my time. (Repeat: people's intentions were in the right place, they just had a lack of understanding of what the SFRP is about).

Enjoyed being invited to and participating in base activities such as festivals, lunches, etc.

Made two trips to UCLA to use the Chemistry library facilities.

Several social functions, such as picnics, conducted by laboratory.

AFGL workshops very worthwhile, and pertinent to summer research.

The presentations were interesting and informative.

None of a scientific nature.

Informal discussions of problems encountered by OEHL/ECQ which fell within my areas of expertise.

The staff went out of their way to include me in their social activities.

Visit to the various Armament Laboratories arranged by Dr. Sam Lambert was very interesting.

I visited Rocketdyne plant in Canoga Park, CA, gave a talk on radiation effects in liquid rockets.

I was cordially included in two staff picnics.

My research colleague talked about visiting China Lake Naval Weapons Center's chemistry lab but this did not materialize.

Collected information regarding new multimedia communication devices; contacted staff at DARPA and DCA to check on possible coordination of research plans.

I requested to attend the SIAM conference on Signal Processing in Boston, MA, but was denied travel funds by the Air Force.

I was made to feel very welcome and would glady return.

Very valuable opportunity to attend EPIC meeting.

Eye examinations and CPR training could have been taken care of at or near home institution rather than take time away from research.

Our approach was to set up a number of informal meetings between researchers at Wilford Hall Medical Center in an effort to exchange ideas and establish the basis for further collaborations. The effort was very successful.

I enjoyed the tour of the laboratory provided by Dr. Lambert.

Invitations to AFATL awards program and summer social; also social cookout by research colleague for UES faculty/graduate students.

Had guided visit to Fire Training and Flightline, nice background.

Had the opportunity to talk with several people at the lab regarding simulator training problems and potential research proposal topics.

Took opportunity of my stay at WPAFB to visit other divisions of FDL as well as other Labs. Was always well received.

I attended a telecommunications conference on Testing for Substances of Abuse presented by Searle Company. Brooks' Epidemiology Division sponsored the program. Only 8 sites throughout the United Stated participated in this tele-conference (sites included medical schools and hospitals: Brooks was the only military base).

I was involved also in in-house research activities in the area of impact in composite.

I attended all major meetings pertaining to the program and also met and talked with various scientists concerning the research proposal that is being submitted. Talking with other scientists was a valuable and helpful experience.

		A (High)		. . .		D (Low)			
15.	<u>Technically challenging?</u>	A-	105	B-	46	C-	6	D-	1
	<u>Future research opportunity?</u>	A-	124	B-	30	C-	3	D-	1
	<u>Professional association?</u>	A-	113	B-	34	C-	10	D-	1
	<u>Enhancement of my academic qualifications?</u>	A-	81	B-	64	C-	12	D-	1
	<u>Enhancement of my research qualifications?</u>	A-	100	B-	47	C-	10	D-	1
	<u>Overall value?</u>	A-	122	B-	34	C-	2	D-	

B. ADMINISTRATIVE ASPECTS

1. How did you first hear about program?

Colleagues	-	74
Advertisement	-	17
Air Force	-	9
Direct Mail	-	66

2. Decisive aspect of application?

NOTE ON THIS QUESTION, APPLICANTS HAD MORE THAN ONE ANSWER

Area of possible future research funding	-	58
Good research opportunity	-	69
Opportunity to work with USAF	-	33
Location	-	14
Financial support	-	5
Chance of publishable result	-	1
Flexible research schedule	-	1

3. Did the program timetable cause you any problems? Yes - 20
No - 138

4. Program information satisfactory? Yes - 143
No - 15

5. Did you have problems in domestic aspects? Yes - 31
No - 127

If yes, explain:

Problem with finding apartment for a short term lease.

I was bored - there wasn't enough social life. This would not seem to be the program's responsibility, however.

Finding housing possibilities and costs. The list of housing possibilities supplied by UES's Boston representative, Dr. Bain, was a big help in getting started, but many phone calls, questions, and a few pamphlets were still necessary.

It is fine for individuals but difficult for families.

Housing in Boston difficult and expensive.

AF opposition to motorcycles on base.

I had difficulty finding an apartment.

There was some question about being able to stay at Bentley College even after early application was made. All problems were resolved before work period.

Problems locating housing; I had to move during the summer because of a 25% increase in the weekly rent.

Most of the apartment complexes do not rent on a short term basis.

Housing was a problem in the high rent Boston area. Found a rooming house.

Last month of apartment lease manager was very neglegent, e.g. - broken air conditioner, dirty pool.

Lonliness - spouse remained in home town.

I was at WSU student housing. I would not recommend WSU to anyone.

Family was separated due to children's school, wife's work, etc.

Cost of living in Boston area was much too high for the expense allowance.

Housing more costly than anticipated.

The VOQ housing was too much like a college dorm (noisy, sharing bathroom, etc.). Although the price was right, if I do this again I'll stay elsewhere.

I was unable to locate adequate housing during pre-summer visit. Many housing agencies listed by the UES office, were not familiar with the program, and did not provide short-term leases. In addition, many required payment of 3 months rent in advance.

Locating suitable housing was quite a problem. It is expensive to live in this area and the allowance is not enough. Evidently, it was possible to live on the base, but I knew nothing of this until the 6th week of my term.

Moving with family is always a problem.

6. <u>Stipend level?</u>

Generous	-	14
Adequate	-	98
Meager	-	46

<u>NOTE, THAT NOT EVERYONE WENT ON A PRE-PROGRAM VISIT</u>

7. <u>Pre-program visit?</u>

Essential	-	99
Convenient	-	39
Not worth expense	-	3
N/A	-	17

8. Housing information:

VOQ	-	19
Apartment	-	83
Other	-	56

9. Mailing list suggestions?

Hoffman Chen, Dept. of Chemistry, Grambling State University, Grambling, LA 71245

IEEE Spectrum, Student magazines, IEEE Proceedings.

Mail literature as usual to universities and colleges.

University Dept. Chairmans rather than school Deans.

Send brochures to all participants for publicity.

Present system appears to be adequate.

Annual meeting organizers of various professional societies.

Darrell Eubanks, ISQS-COBA, Texas Tech University, Lubbock, TX

Engineering Education or ASEE paper.

SIAM newsletter, IEEE Spectrum, ACM Communications.

Dr. John Jobe, Dept. of Mathematics, Oklahoma State University, Stillwater, OK 74074; Dr. Dean ISaacson, Statistics Dept., Iowa State University, Ames, IA 50013

IEEE Spectrum, Society for Computer Simulation, Assoc. to Computer Machines, ASME Journal, ISA Journal, Human Factors Society, American Nuclear Society, Robotics Research, IDA, Avionics Weekly.

American Psychological Association Monitor, 1200 17th St., N.W., Washington, D.C. 20036 (703) 247-7802 for classified advertising.

Please send me information and I will publish it at University of Southern Mississippi.

"Physics Today".

IEEE Spectrum, ASEE Newsletter.

American College of Sports Medicine.

Faculty Development Committee, Tougaloo College, Tougaloo, MS 39174.

Professional societies such as ASME, AIAA, APS, ACS, IEEE, AICHE, ASCE, Combustion Institute, ASEE, etc.

Dr. A. Soloman, Mathematics Dept., Warren Wilson College, Swannanoa, NC 28778.

Research and Sponsored Programs division of the Graduate School of all the universities.

Southern Illinois University, College of Engineering, Carbondale, IL 62901. ATTN: Dean of Engineering

Send program announcement to every department chairman.

Use professional journals - campus of the ACM, etc.

Professional magazines, e.g. Bulletin of the American Meteorological Society, 45 Beacon Street, Boston, MA 02108.

I suggest that you include undergraduate chemistry departments in your announcement.

Could be advertised in trade journals; such as IIE Magazine.

Send to department chairman.

Journal of Biomechanics (Pergamon Press); IEEE Spectrum; IEEE Biomedical Engineering Magazine; and Mechanical Engineering (ASME).

Mail direct to faculty: I nearly missed out because when flyer got through routing list to me, deadline was almost past.

AIAA.

Announce in JEHED (Journal of Chemical Education), and AIHAJ (Journal of American Industrial Hygiene) also ACGIH newsletter.

Announce the graduate student program along with the faculty program.

State and private colleges and universities.

The University of North Carolina at Charlotte, American Society of Civil Engineers Faculty mailing list.

Grants Administration Offices of Universities in addition to specific departments. Persons submitting unsolicited grant proposals to AFOSR.

Journal of Mathematical Psychology.

Advertisements in Aerospace America and Aviation Week.

Dept. of Biometry, Medical University of South Carolina, Charleston, SC 29409.

Society for Industrial and Applied Mathematics mailing list. Prof. J. Godfather, Math Dept., Carleton College, Northfield, MN 55057; Prof. R. Brown - same address.

American Chemical Society Office of College Chemistry.

Chemistry & Engineering News (ACS).

Dr. Alfred Guillaume, Dean of Arts and Sciences, Xavier University of Louisiana, 7325 Palmetto Street, New Orleans, LA 70125.

The Chairman of the Electrical Engineering or Computer Science Department at any university.

Send brochures to all University/College Research and Grants offices. They will see that appropriate faculty will become aware of the program.

West Georgia College, Carrollton, GA 30118.

Advertise in professional journals.

Chairman of Math Departments in universities and colleges.

Send brochure to as many universitites and colleges as possible.

Various universities.

IEEE.

Undergraduate Chemistry Department probably best suited.

APA Monitor.

Mechanical Engineering, Aerospace America, Bulletin of American Phys. Soc.

Department of Psychology, Jackson State University, Jackson, MS 39217.

APS.

AIP - American Institute of Physics.

Mrs. Marian Whitson, Development Office, Miles College, Birmingham, AL 35208.

Contact universities, attention to young faculty and graduating students.

Professional societies (e.g. IEEE) mailing list. Have information available at major conference.

All EE/Computer Science Department Chairmen.

Dr. Paul Roschke, Department of Civil Engineering, University of Texas, El Paso, TX 79968.

Society for Industrial Microbiology and American Society of Microbiology Newsletters.

Norfolk State University, Dept. Math/Computer Science, Norfolk, VA 23504.

IEEE Spectrum, Society for Computer Simulation, Assoc. to Computer Machines, ASME Journal, ISA Journal, Human Factor Society, American Nuclear Society, Robotics Research, Avionics Weekly.

The mailing of an announcement was well circulated at my home institution.

Dean of the Graduate School and Research, Brown University, Providence, RI 02912.

Department of Chemistry: Chairman Southern University, Baton Rouge, LA 70813-2071.

American Chemical Society, ACS List of ACS Accredited College University.

Perhaps AIAA, ASME, SAI, etc. might help.

Dr. Tom Nelson, School of Engineering, University of Portland, 5000 N. Willamette, Portland, OR 97203.

SIGMA XI National office.

National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE), 4439 Seminole Way, Pleasanton, CA 94566.

Dr. Linda Washington, Carver Research Laboratory, Tuskegee University, Tuskegee, AL; Dr. Kujore, Dept. of Chemistry, Morehouse College, Atlanta, GA; Dr. Bender, Dept. of Biology, Morehouse College, Atlantga, GA, Chairman, Veterinary School of Medicine, Tuskegee University, Tuskegee, AL.

10. <u>Addition of Graduate Student Program increased effectiveness of Program?</u>
<u>NOTE NOT EVERY FACULTY MEMBER HAD A GRADUATE STUDENT WORK WITH THEM, THEREFORE THEY DID NOT ANSWER THIS QUESTION.</u>

Yes - 87
No - 14

11. Did a student work with you? Yes - 39
No - 119

Comments:

Graduate student support would have helped a great deal but my graduate student applications were not processed - they were late.

Great help, got a lot of programming done.

Opportunity to work on independent topic was limited. So, the student had to work on a project-related topic independently. As I also had to get acquainted with the project, I could not use students' help in my research.

The GSS was a tremendous help - we accomplished much more together than I could have done separately.

Having a student was essential in being able to complete the project.

Restriction on students status of citizenship.

The student took over parts of the project, allowing me the opportunity to spend more time to consider the direction which the research would take.

It enabled more interviews to be conducted and effectively gave me a support staff member.

As noted in the final report, presence of graduate student support enhanced research accomplishments.

More productive. An excellent idea to have graduate students under this program.

Excellent student. Did most of my computer programming.

Invaluable in helping accomplish our research goals.

An absolutley outstanding contributor to our project. His assistance enabled both of us to make more progress than we originally expected.

I would have liked to have had a student, but he wasn't a citizen.

My graduate student has a strong math and computer background - very helpful.

Seeing about this aspect of the program made it more appealing. It showed a real openness to support research.

Aided in review of background literature.

It would have been very helpful - an under graduate could have helped as well - I could have used programming support.

I feel that the amount of work accomplished was made possible by the contributions of the graduate student.

He was a pain in the rear!

The graduate student contributed significantly to the success of the project.

Graduate student support enabled me to accomplish more work. It also provided me a wealth of fresh ideas and approaches to solving problems.

He worked in parallel with me on slightly different problems so we covered a wider range of problems.

I was able to achieve more results with my graduate student.

A graduate student will be involved starting at the academic year 1986-1987.

Very helpful in both education for student and execution of research activity.

Extremely helpful.

The graduate students worked in complementary areas, which I feel will enhance prospects for future funding.

The assistance of a high school apprenticeship was extremely valuable in collecting and collating reported research data.

Together we were able to accomplish more than twice as much as I would have by myself.

Although a graduate student came with me, our actual research efforts had minor overlap.

Restriction on student status of citizenship/residency.

Enjoyed the association and ideas of graduate students also working on projects.

It enabled me to do considerably more research than would otherwise been possible.

Very useful. He implemented many programs.

The Graduate Student Support was of extreme help for accomplishing our summer objectives.

More than double the effort is possible with an extra pair of hands.

Would not have been possible to complete project without a good graduate student.

Indirectly at Syracuse University.

However, I did have a Lt. assigned to help me which was in fact a great help.

No influence. Her having to do her own paper limited usefulness.

I found it extremely helpful, we produced much more data than I would have alone.

Was not aware of possibility of bringing a Graduate Student.

The students assigned to me were reassigned, at my request, prior to my arrival at the site due to the delay in my arrival date. I fully endorse the graduate student involvement. The preceptor for the re-assigned students told me that the students did outstanding work which will lead to a publication.

However, I did serve as consultant for some of the other students in labs whose home institution was Meharry Medical College and Atlanta University. I think I was somewhat of a motivating role model for them. We had several sessions pertaining to their research and other academic interactions.

12. <u>Program administration overall rating?</u>

Excellent	-	90
Good	-	58
Fair	-	8
Poor	-	2

13a. <u>Comments on the strong points of the program:</u>

Establish contacts for future research.

Interactions between the university professors and the Air Force scientists.

Well organized program, precise and prompt action.

Goals and objectives of program are met, research initiation, getting people together (faculty and lab personnel).

That university professors have the opportunity to work in military academic setting and interact with those scholars in the same or similar disciplines.

Number of openings.

Ability to work in a practically oriented lab environment, developing new research ideas and contacts, learning of problems outside my immediate area of expertise.

Administration at UES and AEDC Focal Point contact, Mr. Marshall Kingery.

Flexibility, good exposure to broad areas of Air Force research interest.

The academic freedom we experienced.

Establishment of personal contacts with potential funding sources, application of thesis and methods to real-world problems.

Opportunity to work with top-quality people to have time to do research without hassles of university business, to use latest technical equipment.

The opportunity to interact with apply researchers.

Technical interchange with AF scientists.

Contacts, educational, one learns a lot by seeing what's going on and doing some work with it, exchange of ideas.

This program provides valuable research opportunities for college faculty and helps to establish Air Force and college faculty research contacts.

Collaborative research opportunity, professional contacts, research or technical exposure.

The program is not highly structured. The participants are free to conduct their research.

Mini-Grant Program. School of Aerospace Medicine has a very academic atmosphere which is conducive to research.

Opportunity to work on a research problem which has already been determined.

Quick response to queries, wide range of options, simplicity of rules, fair public relations, mini-grants.

It's like a mini-grant sabbatical to a faculty member. It gives him/her a chance to share ideas, skills, to apply research abilities in a new environment to learn how the AFOSR operates (how to get a grant, what they're interested in, etc.).

Well organized.

Enables good contacts to be initiated between an Air Force base and a scientist/academic.

Chance to work with good equipment and make contacts.

Mini-grants are available.

Great opportunity for productive research for faculty members of small schools that have limited research facilities. Good chance for continuing collaborative research. Excellent laboratory facilities at Seiler.

Research initiation is the strongest point. Giving researcher freedom in direction in the research was also important.

Meeting people and interesting work.

Well administered. Excellent concept.

Paperwork, while rather extensive, was at least well set up. Paychecks came on time.

Research freedom - access to data.

Allows university researchers to become personally aware of the research problems and capabilities of the Air Force.

Technical and professional association, friendship and challenges.

Emphasis on research.

Research staff at AFGL.

Personnel very supportive, good access to library, the follow-up mini grant.

Excellent laboratory, good equipment, good support personnel, enjoyed comradery with fellow summer researchers.

Opportunity to work with HRL scientists, opportunity for continued contact with the research laboratory through the mini-grant program, ets., willingness of HRL scientists to help out when needed; research flexibility.

Exceptionally varied environment, interested and competent co-workers, exposure to numerous projects.

There are so many it is hard to name a few.

Research facilities, grant opportunities.

Gives an opportunity for the young faculty to get acquainted with the research activity of the Air Force.

Areas of research.

Exposure to research possibilities.

Research atmosphere good, opportunity to do research.

Freedom from administrative hassles; hence opportunity to work.

Enabling small college faculty to 'stay alive' professionally. Giving grantees an opportunity to interact with top grade researchers. Opportunity to continue working in chosen research areas (mini-grant).

Freedom given to SFRP Fellow in following research.

There is a chance to follow through the mini-grant on what was started in the summer.

Caliber of research conducted at AFWAL/MLTC; program administration; potential for follow-on research; professional contacts established; length.

The opportunity to do research with good people in the field.

Ability to get to know the project engineers and program managers and their needs for research.

A way to get one's hands dirty with real problems.

For the faculty, it helps to conduct research on more applied problems and establish contact with the national lab. For the Air Force, more solid and accurate research is done at little cost.

Dr. Timothy Ross is an excellent researcher as well as an organizer. Almost all facilities are available except micro-computers.

State of art equipment; strong staff support - good library and support complete with computer searchers and inter library loan which we utilized.

Ability to demonstrate my research talents and find a place for them.

Ability to work with recognized leaders in the field; access to facilities; encouragement from group personnel; freedom to explore other research possibilities.

Opportunity for collaboration; chance to start research with potential for future USAF support; technical excellence of AFHRL lab and personnel; salary.

Excellent group at AFGL/LIS with which I worked.

Timely execution of paperwork.

UES does a great job; AFOSR understands the need to support basic research in academia.

The opportunity for challenging research, stimulating discussions and future research problems of interest to the Air Force.

Chance to interact with researchers in USAF; exposure to problems and missions of USAF.

Academic Awareness/link to Air Force research need and leading to continued cooperation between academic laboratories and Air Force activities.

Symbiosis between academic and sponsors, flexibility of research period window, pre-summer visits to negotiate research topic, follow-on research opportunity.

Chance to work closely with people from other disciplines. I worked primarily with David Zeigler, a Biologist from North Texas State, Dennis Goldstein, a Physicist at the lab and David Crane an Electrical Engineer from the lab.

AFGL staff members, Dr. Edmond Mood and R. Salter, also equipment already in place.

UES personnel are there to help answer questions and UES has a toll free 800 number to call, so far we are paid promptly.

Able to spend time at good research centers.

Opportunity to become familiar with the types of research projects carried out the Air Force.

Perceptive people at AAMRL/HED. Research freedom to produce from the original proposal. UES's competency and efficiency.

Opportunity for stimulation with new associates and environment; opportunity to continue and extend the summer research with a mini-grant.

I was made to feel welcome and treated as a valued member of the research team at the LASER lab. This statement applies to both the scientists there and to the support staff. This is in direct contrast to my experiences in another summer program. I believe that this is in part due to the excellent matchings between faculty and lab.

Nature of the research, environment of the lab, research colleagues.

The emphasis on initiating research to be followed up through the RIP; the graduate student program; the pre-summer visit; the excellent research facilities available.

Getting to know Air Force research and development personnel.

In my case, my research colleage was helpful and supportive of my efforts. The opportunity to work with him and in his well-equipped laboratory was valuable.

Gives the opportunity to small and medium sized university faculty to engage in fundamental research at a time (summer) they are most free to do so.

Technically challenging research opportunity and valuable professional interactions.

Provides opportuntity to work in an established research program with instrumentation and facilities not otherwise available.

The graduate student support provides faculty members, most of whom teach at undergraduate schools, an experience of working with energetic, resourceful, and bright graduate students from other schools.

Freedom to choose the particular problem to look at. I learned what RADC is interested in. This will help with future contract proposals, I hope.

It gave me an opportunity to interact with researchers at WPAFB.

Excellent way for young researchers to establish collaborations and contacts.

Opportunity to explore new ideas of research; opportunity to work in different environments; opportunity to follow up the research effort with a mini-grant since the ten weeks are not sufficient to complete many projects.

Opportunity to find out the problems facing the USAF and to carry out future research on their problems.

Opportunities to work with state-of-the-art equipment and qualified personnel.

Relative absence of red tape (paperwork).

Acquainting university faculty with practical problems as well as with the Air Force.

Opportunity to work with real applied problems; interaction with non-academic engineers and scientists.

Opportunity to meet potential research funders.

Research opportunities. Chance to work with "experts".

Familiarity with actual problems of science encountered and ability to do cooperative work to resolve these problems.

Follow-on grants are attractive. I have recommended it to colleagues.

Opportunity to work on a project related to my background; exchange of perspective on scientific questions; potential for mutually beneficial research activity.

The enthusiastic support of basic research within a friendly and supportive atmosphere.

Chance to establish new contacts and become more familiar with new topics; exposure to alternate methods, equipment and ideas.

Opportunity to visit and know various Air Force labs. Can provide valuable future research topics.

Organization, research opportunities, interaction with other researchers.

Interesting research, introduction to topics of AFOSR interest.

Hands on experience with experimental tasks and collaborations with research personnel.

Well organized, provides an excellent opportunity for young researchers to learn the mechanisms of research funding within the government.

Increased faculty participations in research of interest to USAF.

Helpfulness of the personnel at Wright-Patterson AFB. Opportunity to have a real impact on the semiconductor device program. I was doing real research - not just make-do.

Enthusiasm of personnel at the research laboratories, provisions for enhancement of academic and research qualifications, the many faceted areas of research in a particular field.

Sufficient flexibility to allow me working on research topic of interest to me and the Air Force.

Opportunity to find out about new research areas and have access to state-of-the-art research equipment.

Flexibility, personal contacts.

In-person contact with the personnel of the laboratory for 10 weeks.

Pay, chance to broaden research interests, opportunity to apply for mini-grant, good location geographically.

Places participant at the cutting edge of this technology while simultaneously placing him in the "pipeline".

Research opportunity in a laboratory setting.

Opportunity to work with excellent equipment and lab facilities, contacts with other researchers.

Research opportunity and professional association.

The program is an excellent program which brings young faculty and very capable people in Air Force facilities together.

Grant administration (pay checks, etc., were all on time) was excellent.

Interacation with participating research laboratory scientists; on-going research opportunities.

Excellent opportunity to meet people and learn.

Contact with highly qualified research people at AFWAL; use of outstanding computer and experimental facilities.

The opportunity to work closely with the project managers; availability of technical reports; only research responsibilities - no conflicting duties.

Research facility, numerous available research problems.

Opportunity to have a solid block of time for thinking about research problem with minimum interference from other facets of life.

It enables university and military researchers to become acquainted and discuss problems and issues of common interest.

No administrative duties and one can do good research.

The development of understanding new research areas of interest to the Air Force and the publication of the cooperative research work done with the Air Force personnel.

Adequate stipend, research locations, means by which program is administered, opportunity for follow-up research.

Opportunity for (often different) research. Find laboratory facilities, well administered, very convenient for a summer program (with the possibility of living in VOQ). Fine collaboration.

Opportunity to be off-campus; mini-grant follow-up; opportunity to determine which projects are of interest to USAF.

The opportunity to make contacts and to lay a foundation for future research work - research work which can be continued at the university and which is of interest to the Air Force.

The chance to work with an Air Force scientist. Opportunity to do a short research project in the summer and obtain summer salary.

Technical work involved.

Provides an opportunity for an investigator to broaden his research interest and enter into new exciting areas of research.

This program is well administered and is very educational. I will recommend it to other faculty.

The opportunity for someone like myself to update their knowledge of current Air Force research needs and the opportunity to make contacts for follow-on research.

Sponsored research - excellent folks at HRL.

For me the strong point was that I could stay in my lab and home as well as work in an Air Force lab, thus I had the best of both without the disadvantage of having to travel.

Freedom given to the Summer fellow, openness and helpfulness of Lab personnel.

The opportunity for academic-military (Air Force) interaction; new perspectives for academic participants on APPLIED research; a professional environment with good facilities for research; a hiatus from academic responsibilities with time to concentrate on research; formation of possible continuing research interests of the Air Force laboratory.

It was an opportunity seeking adventure.

Chance for interaction between faculty and USAF scientists.

Allows faculty members to make a research association with the Air Force. Permits an opportunity for continuation of the research through the mini-grant program, gives graduate students a chance to work in a different research environment.

13b. Comments on the weak points of the program:

Housing.

10 weeks too short.

An earlier time frame of notification so that security clearance can be secured before summer effort began.

The regional liaison person did not send information on the city and housing early enough to be of optimum value. April 1 should be the deadline for participants' receipt of materials. Many do the pre-visits soon after that time. There was no general introductory session for the familiarization of all participants at one location.

Poor pay. Matching research interests - between faculty and lab.

Meager compensation would make it difficult for people with families to relocate. In my case, this was not a problem.

Nothing particularly, considering the somewhat short duration of the program. Mini-grants would certainly enhance the mileages of this program.

Lack of coordination between UES and AF EFP. Instruction brochure is incomplete and vague.

Lack of detailed guidelines to write the proposal for follow-on research opportunites.

Low stipend.

Isolated from a group of statisticians.

Inadequate quality responses, public relations, understanding discussions, improve housing.

Nothing, really. I think the staff at AFHRL/OT was extremely accommodating.

Has a preference for current nationality over experience and academic qualifications.

Ten weeks are not enough to really get involved.

All of the ten weeks of the work has to be done at an Air Force site rather than possibly at one's home institution. I'm sure that I would have accomplished more if I could have spent just a week or so at the Air Force base to talk with people and collect data and if I could have returned to my home institution to finish the work.

Lousy arrangements for housing and medical care.

Don't believe the USA takes full advantage of the potential of such a program. I don't believe a single summer visit is as efficient as sucessive visits because it takes considerable "orientation" time.

You need to do something about getting the security clearances in a shorter time period. This was a major problem and kept me from using much needed source material.

Payment system - could be weekly.

No set aside funds for purchasing consumable laboratory supplies.

Too much emphasis on goals and objectives before the first check. It takes some time to find out about the research project.

Social interaction with other program participants. One get together in the 4th week is not enough. Regular get togethers (seminars) would be good. Also get us a list of participants before the program starts.

Issue temporary I.D. for better library access, could have more introduction to other groups and divisions at AFGL.

Lack of information and communication concerning overall purpose of the lab.

In my case, a lack of clear guidance in the beginning, and paucity of documentation of what has gone on before. Yet, I think these were minor problems that I was able to work through due to the helpfulness of my HRL colleagues.

UES.

Time period, the stipend could be better, relocation.

Stipend level too meager, 10 week period may be extended to 12 weeks.

Should encourage if possible, mini-grant/AFWAL facility interaction in certain areas.

Only ten weeks long.

Too many AF personnel feel threatened by program - they retaliate by creating "mickey mouse" problems. Library facilities on-site need improvement. Greater care is needed about fellow's time.

It would be helpful to know in advance exactly what specific projects were being worked on at lab locations. If security is a problem, arrange for clearance if project matches applicant's interests.

No real mechanism for correcting problems in such a narrow time-frame (I don't think that this has a solution).

The difficulty in finding resonably priced, short-term housing.

Mini-grant funding level too low; funding opportunities and procedures addressed in insufficient detail.

The paperwork and report writing can carry over well into the school year, especially since many faculty are reluctant to write a final report until all of the "loose strings" have been cleared up.

None that I can think of.

The stipend is too low, the expenses for meals and lodgings are not paid for the travel time which makes it difficult to accept the appointment for many qualified people.

Perhaps more involvement in the "big picture" of what is taking place at the lab. It's easy to sort of lock yourself into your project - more sharing between colleagues.

Page limit on final report. This is a real problem. If the lab is going to make sense out of my work, the report needs to be complete. In my area, 20 pages is too short, 30 pages would be more realistic.

I would have appreciated earlier notice that I could have selected/recommended a graduate student to work with me. As it turned out, I did not have enough time when I did receive notice.

I would suggest that the candidates for summer appointment be informed in advance of the portion (or all) of his/her stipends that is taxable.

Not requiring supervisors (research colleague) to attend the briefing by AFOSR; too much managerial distance between me and my effort focal point. He was a manager, not a researcher. We never had talks.

Difficulty in cashing your checks. The base bank suggested that if UES wrote a letter to them guaranteeing the check they would cash them. Maybe some suggestions in the appointment letter regarding open an account with base credit union or have UES mail to the participants home bank for direct deposit, etc. I was forced to use my Master Card for cash advances.

Low stipend, rigid length of time. Instead of 10 weeks, I recommend giving each fellow a choice between 8 to 12 weeks to be arranged with the research lab.

Temporary relocation is somewhat of a hassle but is unavoidable, of course.

I ended up working with people who knew what they were doing; there probably needs to be some formal mechanism in educating the Air Force participant in ESD, at least.

Time scale.

Not enough stipend, stipend should depend on rank of faculty (just like we are paid at the university).

Should not confine locations to only Air Force laboratories.

Relocating for 10 weeks. Inflexibility of work schedule.

Supercilious reports of effort. Research does not proceed like an assembly line.

Ten weeks is too short a time to do more than initiate a research project particularly an experimental project.

As mentioned previously, housing information should be made available much earlier. I had already been to San Antonio and had found housing on my own before the information arrived.

No major weak points.

The government purchasing process which is too long-term to be useful for the relatively short duration of these projects.

For my purposes I did not find any aspects of the program that should be improved.

Not significant.

It would have been nice to learn more about current projects in areas related to my area; that is, projects supervised by personnel other than my focal point.

Stipend very low; local participants are not paid expense allowance at all; number of mini-grants not enough.

Limited funds for mini-grant program; budget could be higher and more applications could be funded. Stipend and expense allowance could be increased. It is difficult to maintain two residences (permanent and temporary) when this stipend may be your only income for the period.

My research location is very project oriented. This worked out well for me, but I can imagine situations where they might not be a good match between projects available and the researcher assigned to the location. Also, there is somewhat of a problem at AFLMC of matching projects to the ten-week research period.

Perhaps require stronger methodology to insure that participants are asked to/are allowed to work in area of primary expertise, or at least close to it. Need guidance, to participants and USAF personnel, regarding how research topic is "chosen".

At least in San Antonio, housing for the participants is a problem. As discussed above, I lived in the VOQ and it was great, but I was unusually fortunate to live there.

Ten weeks is too short a time to work on a reasonable research problem especially for persons who are not familiar with the environment here at the laboratory. It would be better if this program is over a two summer period.

10 weeks is short and the labs don't have a financial investment in you. With nothing at stake one can be left floundering.

Perhaps the results which are found are not implemented into the actual design as fast as could be expected.

Stipend levels should be tied to normal academic salary - even though this would be difficult to administer. The graduate student portion of this program was not useful to me because I would have had to bring my students from our lab and equipment is somewhere without the facilities necessary for their research.

As it turned out in my case, communication was too infrequent or incomplete.

The only weakness I see is in the area of level of support in monetary terms.

I can't think of major improvement that needs to be made.

Low stipend, short period (unavoidable).

Insufficient social networking of other visiting faculty. Names, addresses and interests of other visiting fellows and graduate students would have been helpful earlier in the summer program.

Government employees are sometimes hindered by bureaucracy in their research efforts, so they cannot always be of help.

Too short.

Would be nice to have more secretarial help. I'm not blaming the secretary - she was as helpful as could be expected given the number of people she was taking care of.

Dissemination of pertinent information regarding processing of UES Fellows (housing, procedures for clearing at the research facilities, etc.).

Time is short but there is no way to change this.

Time crunch. Need to ask host group to get final report typed.

Unavailability of free access to the work place during non-office hours.

In my situation - immediate supervisor(s) were very busy - little interaction or feedback.

Needs more flexibility - Air Force policy makes procurement of needed items slow and time consuming.

Low stipend.

I would recommend participation of many more graduate students.

Because of time constraints to order expendables, glassware, chemicals, etc. -- the faculty should visit facility early and be required to order materials they need 3 months ahead. I had almost everything I needed but a few items were missing (not critical, however).

The ten week "window" is a limitation of the program. However, due to the constraints of the university environment it seems to be the only alternative.

In many cases it is a real sacrifice to relocate.

Low stipend.

SECRE1 clearance came so late that it had little impact on the summer effort; two summer appointments are needed; not much contact with other sections in the lab.

The "Contractor" status prohibits me from getting personal computing facilities. It also prohibits me from getting a reasonable office space.

Inadequate quality responses, public relations, understanding, discussions, improve housing.

A bit of social isolation in just picking up and relocating for 10 weeks - hard to relocate family for that timeframe; hard to establish instantaneous relationships with people.

No important weaknesses in my experience.

More interaction with the researchers at the base.

Time limitations during summer period for truly extending present understanding, and mini-grant program should have support increased not held as is the present situation.

Time limits.

Probably the single one is lack to some sort of access to an equipment budget over that of the host laboratory. Possibly discouragement of a 2 summer sequence for projects that have merit.

Tend to isolate visiting professor from office personnel; visiting professor not used to fullest - should be programs of lectures, etc.

Duration could be a little longer.

Secretarial help for typing should be provided.

Administration of program exceedingly poor.

I believe there should not be a locked in 10 week period time restrain. Program should be flexible in terms of 8-12 week period (prior approval, of course) depending upon the nature of the research project involved.

At least during non-summer appointment periods, payment for travel should be processed and checks mailed to Fellows immediately upon receipt of vouchers or at least within one or two working days.

Hassles of UES method of receiving payment. Format of final report is stifling.

10 weeks is a very short time to get much done unless there is a mini-grant to follow.

Bureaucracy of the contractor (UES).

I know of no weak points in the PROGRAM: its success, in my opinion, depends on the compatability of the participant with the selected site (the individuals there, the definition of a research project, the necessary resources, etc.). This might vary from lab to lab and from person to person; however, that is not the program's weakness.

Had to terminate some projects early - this is inherent in a summer position.

At this point, I can find no weak points in this program. There are many strong points. I would like to stress my desire for continuation of research at my home institution through the mini grant program. I think two summers provides one with the expertise to further continue the work.

14. <u>Has this been a fruitful, worthwhile, constructive experience?</u>

Yes - 157
No - 1

15. <u>Other remarks</u>:

I have had, or rather have had to due to the summer conditions of finance, worked in several outstanding laboratories in government and higher education, and this experience was the best of them all. Not only in what opportunities it gave to me, and opened for me, but in terms of level of competence I encountered at the Lab.

I feel I have benefitted greatly from this program. Thank you.

Visits by UES to meet people at various locations are useful - voices on telephones are not indicative of people. This provided an opportunity for individual research. Ray Lempke was occupied with trying to pass his Ph.D. exam a second time (so he didn't communicate much) and Major Anderson was working on Ch. 2 and 3 of this Ph.D. thesis. The best aspect was the friendly attitude of blue suiters and civilians. The morale was very good. I am trying to find a return route to New Mexico - via grants and switch of jobs (on 1-2 year leaves). Again, the people attitude was great!

Was personally very beneficial and enjoyable. I feel I contributed to the program at my Branch. I believe the DoD should further exploit academic resources for the benefit of both.

UES should provide postage paid envelopes for all the reporting they require.

My participation in this program has broadened my knowledge in the area of nuclear arms and sharpened my research skills. In addition, I have developed an understanding of how an Air Force base operates and experienced living in a very interesting and different section of the country.

For non-classified areas the program should be opened up to non-American citizens, as an aid to involving those individuals with qualifications most suited to the problem areas to be addressed.

I have enjoyed the research, the people and the places involved in my summer fellowship very much and I thank you.

The biggest disappointment for me was the inability to use all my talents. I would have welcomed the chance to teach a short course, etc. I think such an addition to the program would aid all concerned.

I am happy to have this opportunity. It is one of my most productive summers.

Ten weeks turned out to be about two weeks longer than I needed to complete the project. I would have liked to have left earlier, but the assumption seems to have been that I had contracted to stay 10 weeks and thus should stay for the entire period. Some provision might be made to allow people to leave earlier if their project is finished.

Office space in Materials Lab was really a problem. I appreciate the utmost kindness of Dr. Whitney to let me share his office. But it was sometimes too much disturbance to both of us.

Twelve weeks research is better.

A truly valuable program. Expand this program to increase the interaction between university researchers and government laboratories. A more flexible time duration is also desirable, say 8 to 10 weeks not necessarily for 10 weeks.

Can our security clearances be continued in the event of the award of mini-grants?

This program is well administered and is very educational. I will recommend it to other faculty.

The people valued my knowledge and experience and made me feel most welcome.

I am simply appreciative of the opportunity extended to my by HRL lab, and hope my research efforts and contributions effectively enhanced the lab in achieving their own research goals.

This program has had a wonderful effect on my career and now have a new discipline, new colleagues, will publish shortly, and I will continue the research for the next several years.

It is an excellent program. The computer facilities at WPAFB are extremely user unfriendly. Researchers expecting to use the facility should be provided with an orientation course of some sort.

It would be nice to have some social activities between the summer fellows, UES people and Wright-Pat people. Have badges and car passes ready for fellows when they arrive. Then we don't have to go chasing all over and waiting in line.

USAF Academy library is great for undergraduates but sadly lacking in reference material and periodicals by researchers.

I had greater freedom to work than at University of Florida but some improvement could be made.

I believe some of the daily expense allowance for people living with 50 miles of their research location should be reinstated. The mileage (about 2500 miles for me) wear on auto, food, etc., expenses still exist and I believe we are being shortchanged in the program. Otherwise, I think the program is great.

I hope my affiliation with AFGL will be allowed to continue through a mini-grant.

I am grateful to UES for all of the help in easing administrative problems (I was selected very late in the spring).

I believe the program is definitely worthwhile. In particular, it gave me an opportunity to maintain my research ability because I teach in a small college where research is not required and hence, no time is provided for it.

Most of the time, the labs expect the researcher to work on an on-going project and produce results. It is difficult to achieve this in 10 week period. Most of the time would be spent in getting familiarized with the project.

I truly enjoyed the experience and for that it was very worthwhile.

Partial support for a visit to the home city (during the research period) to take care of academic business and to see family would be very helpful.

The program is obviously beneficial to faculty. One great advantage to the labs is that more faculty members are made aware of their problems and are thinking about applications of new ideas and techniques to the laboratories problems. When they stumble across an idea which is useful they will refer it back to the labs. So the Air Force really gets more than just 10 weeks service from the faculty they get a lifetime contact.

Look in joining O-Club.

I thought the program was excellent. The only thing that I would change are the restrictions on the dates that pay checks are issued. If for some reason your voucher was one day late, it is three weeks before you receive your check in the mail. It would be more convenient if you would issue the checks weekly.

I truly enjoyed my summer stay at AAMRL/BBD. I would strongly recommend the program to my colleagues and graduate students. I hope that it continues.

I have never met a more professionally cooperative and collegial group than the people at AFHRL, WPAFB. I recommend this program to any young researcher, and I would jump at the chance to do it again.

Program can be improved if micro-computers are available. For someone who uses such computers a lot, a change to a specific maintenance/mini can waste considerable time in both getting familiar to the system and modifying the softwares. 2) Graduate students can improve the program a lot. We have problems in recruiting domestic students for this assignment/program, since all our domestic students are from already sponsored by the Army Corps of Engineers. I believe the Air Force could benefit a lot also from foreign students as long as they are not assigned for classified material. 3) I would suggest that the candidates for summer appointment be informed in advance of the portion (or all) of his/her stipends that is taxable.

I look forward to working on the Mini-Grant program. This opportunity will help as Motlow College begins its linkage with Tennessee State University to offer Engineering degrees. This program has and will continue to upgrade engineering education in Southern Middle Tennessee. This mini-grant should allow me to finish my doctoral work and then be, the only doctorate on the Motlow College technical staff.

This is very worthwhile program to USAF as well as to faculty participants. Congratulations to whoever thought this program up.

My congratulations to UES and AFOSR for a well organized program, which undoubtedly benefits both Air Force and the participants.

The experience has been truly outstanding. I have learned a tremendous amount of useful information, met a lot of excellent people and gained valuable insights into the magnitude of the problems facing the Air Force. I sure would like to do it again.

I enjoyed the experience.

Thank you for a productive experience during which I met many fine people.

1) It is important to distinguish my comments on the Program from my comments on my particular situation. My supervisor was in a tough spot. No one ever briefed him (or ESD/XR in general) about the SFRP and he was led to believe that his job was to watchdog me. ALso, he was living away from his family and newborn child and had housing and other problems. He was under a lot of stress. This situation arose because of a management error at the level of ESD/XR. UES should engage in a dialog with ESD/XR prior to next year's Program. All they need is a briefing about what the SFRP is all about. 2) UES needs to have dialog with MITRE about security. 3) Finally, let me reiterate my praise of how UES manages the SFRP. They did an excellent job in all respects. Prompt payment of vouchers was especially appreciated. UES gets my highest recommendation on all counts.

A good portion of my time was spent learning well known (but not to me) results in estimation theory. I fell that I was "out of my element" since I had no prior experience or knowledge in this general area of research. This is both bad and good. Good because I like new ideas and the chance to do new things. Bad because the time was not sufficient to really become involved in any specific problems in any depth. I should spend two summers at this - Alas.

Appreciation to Mr. Rodney C. Darrah and Ms. Susan K. Espy for providing prompt and excellent working services.

This is an excellent program and the AFRPL a fine place to work. You might consider past participants in the program as contacts to encourage and inform others who might be considering applying.

By-weekly reports are a nuisance. Deduct taxes and S.S. from pay. Pay in fixed increments.

There was a period during which there was no lab technician or consultant. A lot of time was spent in searching for proper documentation for the use of the facilities. Even worse, I had to do a great deal of trial and error experimenting the computer equipment when the documentation was either not found or rather sketchy.

Very worthwhile.

I like to thank UES, OSR and Engineering Services Center at Tyndall AFB for giving me the opportunity to study "Asphalt pavement rutting problem".

Thank you UES.

A valuable well run program for encouraging interaction between the academic community and the Air Force.

I enjoyed it - both professionally and personally.

It was a very worthwhile experience - I am glad I took the opportunity.

My experience was very positive. I have recommended it to colleagues and shall do so in the future. The only regret regarding the program is not having more opportunities to meet other SFRP fellows. Perhaps informal gatherings could be arranged (like the evening meetings, but without dinner or formal agenda).

It is wonderful to have such an exciting opportunity to go out for a short period of time to another laboratory and enhance the research capabilities.

An outstanding program.

I found the people at UES very helpful, particularly Mr. Darrah, and greatly enjoyed the experience. FJSRL is a great place to work. The research facilities are excellent, the support staff is excellent and the environment is excellent. I feel very fortunate to have been able to participate in this program.

This program has been very beneficial for me. I have gained much practical experience in the areas of electrophoresis, and lipoprotein composition of the blood. I have also met some capable scientists and graduate students with whom I hope to continue collaboration as I continue research in these areas.

I must say that I liked the program. This was very useful for me as, this time I had interaction with several members of the Flying Qualities Group. Mr. Frank George, Group Leader, was very helpful and encouraging all along.

This program has been a real boost to my research activities. I'm very glad I participated.

Although the main function at OEHL is not basic research, they made every effort to assign a project which, while having practical application for them truly represented a basic research project and required the participation of a research scientist with expertise not then available at OEHL. I feel therefore, that I have been able to contribute something worthwhile to them while also enhancing my own career. This has been an excellent opportunity and I look forward to additional participation through the Mini Grant and/or other available programs. One way you might consider altering the program is to allow the participation of talented undergraduate as well as graduate students. I teach at a school which does not have graduate students. However, I know of several undergraduates who are as talented and able as any graduate student to make a valuable contribution to this program. Awards would depend heavily on recommendation from faculty advisors but I believe that the experience would be of immense value to them and could even benefit the Air Force through the possibility of recruiting these students after graduation if they have had a rewarding experience in the program.

I have talked with three professors and two graduate students in the program here. I met briefly with several other professors. I wish I had met all the visiting people and had a brief description of their work. I would also like to know the scope of the other 150 UES research fellows and their fields of interest and projects. Even a printed listing of name, inst., department, laboratory, project would be interesting.

Good program - continue and strengthen.

I am glad for the experience.

I have enjoyed the program and feel that I have made good contact with the people in my summer research location. It was also a great opportunity for my graduate student to participate in the program.

The salary is set at about the assistant prof. level. As a well published succesful (full) professor I would have appreciated some acknowledgement of that. I enjoyed the summer very much.

Lt. Col. Brocato's groundwork made going to Tyndall simple, convenient and pleasant. Mr. Joshiz, Capt. Paul Kerch, Lt. Seitchek, Dr. Howard Mayfield, Sgt. Dan Stork, Mr. Mike Henley were very helpful and fine colleagues everyone in environics was helpful and friendly. Lt. Col. Bramlitt took command early in summer - he went out his way to obtain information for us. We had a small problem in availability of the G.C./Man Spec. but only due to unexpected electronic and mechanical difficulty with the instrument. We simply needed it when it went down.

The renumeration for participants should be based upon academic rank at present salary.

Since this program is so useful for new faculty (and the enrollment will be limited) small, every year new people should be asked to particpate for other's sake. That is make it a one time program. If the host institute wants the participant to come again, they can invite from their own resources.

I found UES AFHRL/OTE and contractor personnel most helpful and supportive. Thank you.

This summer work was extremely fruitful both directly and indirectly at it related to liquid rocket combustion prpblems and other problems encountered by industry, such as Aerojet and Rocketdyne.

This questionnaire is somewhat inappropriate probably for most Ph.D. researchers. Also in my case I was brought in more as a resource for the Materials Laboratory personnel to become familiar with my technique.

The fellowship provided me with an experience that was most worthwhile and one that I needed very much. I had not had the opportunity to be away from my academic responsibilities for an extended period for many years. I enjoyed the chance to read in depth in the library about drugs and their actions. I broadened my knowledge in pharmacology/toxicology which will not only make me a better researcher but also a better teacher. I had the opportunity to learn methodology as well as contribute information to the Drug Testing Lab by researching problems that were present and which the personnel there did not have time to do. I regret that I returned to my institution just at the time when the accreditation site visitors were coming (only happens every 3-5 years) and I am the chairperson of Cirriculum Committee for the School of Medicine. That plus my teaching has delayed my final report. Nevertheless, I would not trade my summer experience at Brooks for a less hectic past few weeks.

I feel that I immersed myself into the project as much as my background and time permitted even though my background could have been helped by more previous work in functional analysis and deconvolution theory. It may be that my focal point saw my background as inadequate and therefore was not disposed towards use of much time. If so, I don't understand how I was offered a second summer appointment. Nevertheless, I learned much and would be willing to continue effort towards further understanding of the topic.

It was a fruitful, worthwhile, constructive (and, I might add, enjoyable) experience. Thank you.

I really commend my focal point, Mr. Marshall Kingery, for the outstanding job he did in orientation of this program, showing us the facilities and always lending a helping hand to our difficulties.

The program was well conducted and very valuable. I would like to participate as many times as I can.

The program was extremely beneficial to me and I am confident that it will help my professional career.

The UES visit to AFWAL was much too late to handle any questions/problems about summer program administration. It would have been helpful to have received the AFOSR briefing several weeks earlier, to better prepare a proposal. For example, the UES literature says mini-grants will begin in October, when, in fact, they will not be awarded until December. This has a direct impact on planning the proposal budget, particularly regarding graduate student support and departmental matching funds.

Well run program, maybe a little more emphasis on funding after the mini-grant runs out.

I think that the research opportunity has heightened my intellectual appetite for pursuing research and reading in an area with strong interdisciplinary applications. The opportunity for pursuing research in the area of Artificial Intelligence and Reading through follow-on research will enable me to contribute to the theory and application of knowledge on the subject.

The staff at UES was extremely helpful and proved themselves willing to respond to specific situations and circumstances with positive solutions. My experience with the participating laboratory could not have been better and I look forward to a continuing relationship, both personal and professional.

Hope the program can be expanded, including funds available for follow-up grants.

Thanks for giving me the opportunity to be in this program.

Please continue and even expand this program and the mini-grant program.

For the first time Brooks Army Medical Center and Brooks School of Aerospace Medicine are doing a joint research project. The research done this summer is no less important in this feild than any other, if the most important work done anywhere at anytime.

I was very pleased with the summer and I am making every effort to keep the collaboration going.

My tenure at Brooks AFB was a very rewarding experience for enhancement of my academic and research qualifications as well as personal development to further increase my effectiveness as a professor. The opportunity to continue my affiliation with the research facility and to participate in research generated from my summer endeavors is an excellent prospective.

Very good program and my research colleague and his lab were great.

This has been an excellent 10 weeks of work.

An informal get-together of all the participants at the end of the summer would be nice.

Excellent program.

I would very much like to receive a mini-grant to continue the research at Morehouse College. Such an award would be vital to my research at Morehouse and enhance research skills of the students (both graduate and undergraduate).

APPENDIX 1.C

LABORATORY REPRESENTATIVE'S QUESTIONNAIRE & REPLY SUMMARY

1986 USAF/UES SUMMER FACULTY RESEARCH PROGRAM

EVALUATION QUESTIONNAIRE

(TO BE COMPLETED BY LABORATORY REPRESENTATIVE)

Laboratory/Center ____

Name ____

1. How do you rate the correspondence, verbal and telephone communication, and other aspects concerning program administration?

Excellent____ Good____ Average____ Poor____ How could it be improved?

____

____

2. The participant selection process is two-fold: academic and technical. Did you have sufficient time to conduct an evaluation of applications?

YES____ NO____

Comments:____

____

____

3. Was the number of faculty researchers assigned to your organization satisfactory?

YES____NO____. If not, how manv would be desired?______________ How do you determine this number?

____

____

4. Please rate the expense-paid pre-program visit:

Essential____ Convenient____ Not worth the expense____

5. In your opinion is the ten-week time period an optimum length of time to develop a viable working relationship among the faculty researchers, students, laboratory/center personnel and programs? YES____ NO____. If no, what length would it be.

____

____

Other comments:

____

____

____

____

6. Did your laboratory/center establish a seminar program, or other means, to "tap" the faculty associate's academic knowledge other than his research assignment? YES____NO____.

If yes, give description and evaluation.

____

____

____

7. Did the laboratory/center conduct a general briefing, tour, and/or other formal means of welcome and introduction for the associate assigned to your organization?

YES____ NO____.

8. Did you have a formal exit exercise for each associate such as a final technical briefing presented to the organization management, a private interview, or other?

YES____ NO____.

9. In your opinion, what was the overall quality of this year's participants as measured by attitude, technical competence, work habits, production and meaningful research accomplishment?

(Note: These answers will be held confidential.)

List Names	Superior	Excellent	Average	Poor

10. Do you believe the Graduate Student Program enhances the Summer Research Program?

YES____ NO____

11. Was a student assigned under the Graduate Student Summer Support Program to your laboratory this summer? YES____ NO____. If so, was their participation productive? YES____ NO____.

12. Please furnish any recommendations you may have on improving the Graduate Student segment of the program.

____

____

____

____

____

13. Site visits were made by Program Director and/or Administrator and the AFOSR representative. Do you feel these visits are beneficial to the program participants and Laboratory in understanding the management of the program? YES____ NO____. Do you feel these visits should be done again next year. YES____ NO____.

14. UES has a coordinator assigned at your base to assist the Summer Faculty participants in the administration of the program. Did you find this beneficial to the program. YES____ NO____. Are there any problem areas coordinators should administrator in future years?

____

____

____

15. Please furnish any other comments or suggestion to improve the program in future years.

THANK YOU

1986 USAF/UES SUMMER FACULTY RESEARCH PROGRAM
EVALUATION QUESTIONNAIRE
LABORATORY REPRESENTATIVE

1. How do you rate the correspondence, verbal and telephone communication, and other aspects concerning program administration?

Excellent	-	11
Good	-	9
Average	-	2
Poor	-	
No Response	-	

How could it be improved?

I can't identify any shortcoming.

Send all the initial information at one time- it seemed to trickle in, confusing things a little.

Works well, I could have used more support from the coordinator you provided (not to infer he didn't do his job - he did).

Provide more timely information on who is actually scheduled to be our summer faculty.

We had a single participant in 1986, and serious weaknesses in program administration were not apparent. Much weaknesses may have appeared if several scientists had been participating at our laboratory simultaneously. A minor weakness was the occasional typographic error in UES correspondence, leading to temporary confusion on part of reader.

Guidance concerning non-U.S.citizens should be improved.

Some of the faculty associates were confused about who was supposesd to certify their vouchers.

2. Did you have sufficient time to conduct an evaluation of applications?

Yes	-	17
No	-	5

Comments:

It is always difficult to get the applications to the proper technical people in time for review, but the time is adequate.

I receive 100 applications each year, reject 50 on 1st screen, prioritize the remainder, I am assigned 15-20 routinely - it gets pretty hectic, and I have to do a lot of second guessing on merits of each professor and possible assignments.

Need minimum of 3 weeks.

We had one applicant. Evaluation time was quite adequate.

There was just too little time between when we got the application and the time we had to make a choice. Evaluation of only the paper work submitted is insufficient. Discussions need to be held with the prospects to determine if mutually beneficial research programs can be devised - suggest starting right after Christmas or even early December.

Additional week to get lab evaluations to UES would be helpful.

Need to receive the applications as they are received at UES, not in batches a few days before the selection process.

3. <u>Was the number of faculty researchers assigned to your organization satisfactory?</u>
   Yes - 15
   No - 7

<u>If no, how many would be desired?</u>

10, By the number of requests from the in-house of research - we were going to fund two ourselves this year but due to a calculation - we funded one.

14, Two professors per RADC Directorate to be put into critical technology areas.

2, We have 3 veterinary hyperbaric medicine chambers. This capability will readily accommodate 2 Summer Faculty Research participants.

19, Our laboratory has 19 in-house work units, and we would like one researcher for each work unit.

10, By the number of laboratory scientists requesting researchers.

12, The number requested by our research colleagues.

2 or 3 more, By the interest shown in the program by our scientific staff.

4. <u>Please rate the expense-paid pre-program visit:</u>
   Essential - 21
   Convenient - 1
   Not worth the expense -

5. In your opinion is the ten week time period an optimum length of time to develop a viable working relationship among the faculty researchers, students, laboratory/center personnel and programs?

Yes - 19

No - 3

Other comments:

Considering scheduling difficulties it is reasonable. If a slightly longer period were available, it would be very effectively used in most cases, but not all. On the assumption that more participants are available on the shorter period, then the 10 weeks is about optimum.

Although 10 weeks is adequate another 2 weeks would be beneficial since it seems the researchers usually spend the last 2 weeks writing their report. This only allows about 8 weeks for actual research.

Ten weeks is satisfactory. Optimum length is determined by the "quality" of the person and the research undertaken.

Time enough to develop relationships, but was "fast track" for some of the research. Optimum would depend on the effort.

We are comfortable with ten weeks; once in a while would like to have the contract fund an additional 1 or 2 weeks for a professor.

10 weeks is too short for most projects to get the quality of support that would be desireable.

The 10-week period was sufficient to develop viable working relationship. However, more time could have been used for actual experimentation; while a research protocol may be designed for 10 weeks, unanticipated events may dictate additional time.

Longer, minimum 4 months would be optimum, but probably not practical. I believe the short period of work time could be more effectively utilized if we can get a little more time on the front end to allow Air Force sponsors a better opportunity to evaluate prospective Summer Fellows in relation to the work the sponsor wants performed. More likely to get a better match between researcher and research project. I have also found instances where there has been little other than the pre-program visit. More communication needs to be encouraged and perhaps structured into the program.

However, 12 weeks would allow for a two week period for orientation, data compilation, or research preparation with a full 10 weeks available for productive research and report preparation.

12 weeks. Research time is lost on preparing final report.

I answered this question both ways. Yes, the program was long enough in the sense that starting any earlier or ending any later would impinge too much on the individual candidat's schedule at the university. No, in the sense that by the time the candidate gets starting on his/her research project, it istime to return to the university. Thus, leaving some question as to the development of a viable working relationship.

6. Did your laboratory/center establish a seminar program, or other means, to "tap" the faculty associate's academic knowledge other than his research assignment?

   Yes - 11
   No - 11

If yes, give description and evaluation.

Both branches that used summer faculty had at least one special session - we could have done more in this area however,.

Several informal seminars but no formally established program.

Briefings helpful.

Periodic presentation and discussions with technical managers.

The "tap" was on a close working relationship with the visiting faculty and our staff.

General seminars and research project seminars were held.

Some of the professors give seminars/presentations in various technical areas.

Brown bag lunchers for SFRA and lab personnel. This was our first try; we had some growing pains, but all who participated thoroughly enjoyed it.

Each was asked to give a seminar on their research findings toward the end of the 10-week period. This worked out well but in the future, I think it would be better to schedule both a pre and a post session. We did not avail ourselves of the opportunity for additional seminars since the schedule of work was very tight. We plan to do so next year.

Several conferences were sponsored in the local area and all research candidates were given the opportunity to attend.

7. Did the laboratory/center conduct a general briefing, tour, and/or other formal means of welcome and introduction for the associate assigned to your organization?

   Yes - 15
   No - 7

8. Did you have a formal exit exercise for each associate such as a final technical briefing presented to the organization management, a private interview, or other?

Yes - 17
No - 5

9. In your opinion, what was the overall quality of this year's participants as measured by attitude, technical competence, work habits, production and meaningful research accomplishment?

List Names	Superior	Excellent	Average	Poor
	45	39	12	

10. Do you believe the Graduate Student Program enhances the Summer Research Program?

Yes - 19
No -
No experience - 3

11. Was a student assigned under the Graduate Student Summer Support Program to your laboratory this summer?

Yes - 15
No - 6
No experience - 1

If so, was their participation productive?

Yes - 15
No - 1

12. Please furnish any recommendations you may have on improving the Graduate Student segment of the program.

Reduce the (perceived) pressure on us to accept a graduate student solely on the faculty member's recommendation and desires.

Our experience was so good that we would be pleased to have more and will make a stronger effort to help advertise that aspect of the program in the future.

Should work closely with the summer professor.

I have a problem with the schedule in which professors are selected and then graduate are selected, but I don't know of an easy solution. I strongly recommend that the contract support graduate students coming back a second time. I prefer about 1/3, since these "experienced" hands are of great help to the 1st year students on the logistics of survival in an unfamiliar setting.

Need more applicants. Our graduates were super - could use more. Make the selection process longer (3 weeks) and start earlier. They don't need to be tied to performing as the lab people (sponsor) take great care of them!

Not applicable, we had no personal experience with Graduate Student segment of the program.

None - excellent program/opportunity.

13. <u>Site visits were made by Program Director and/or Administrator and the AFOSR representative. Do you feel these visits are beneficial to the program participants and Laboratory in understanding the management of the program?</u>

    Yes - 12
    No - 2
    N/A - 8

    <u>Do you feel these visits should be done again next year?</u>

    Yes - 12
    No - 4

14. <u>UES has a coordinator assigned at your base to assist the Summer Faculty participants in the administration of the program. Did you find this beneficial to the program?</u>

    Yes - 12
    No - 2
    N/A - 1

    <u>Are there any problem areas coordinators should administrator in future years?</u>

Coordinators should work on security clearance earlier.

No contact with the coordinator - it seems they should initiate contact with me.

The coordinator should have longer hours in his office - three hours in the morning are not enough. More up-to-date list of housing is needed. Suggest using the Civilian Personnel Newcomer's Package.

We encountered no significant problem areas.

Local coordinator was not well informed about UES and its structure. He always did find out what we needed to know and get back to us in the early part of the program. By the end of the summer he had come up to speed.

The Coordinator at AFGL did an outstanding job this year, as in past years. She handled a variety of problems for faculty members and did not limit her help to just a few specific problems. Very helpful!!

Dan Danishek did an excellent job. We need "special badges" for the faculty researchers. Procedures for assigning badges/passes and collecting them could be improved.

I was not aware of a base representative.

15. <u>Please furnish any other comments or suggestion to improve the program in future years.</u>

Insure that skills presented in the resume is consistent with skills required on the job. Make sure candidate understands the task to be performed and make certain security clearances are on file.

I recently briefed the Commander and Tech Staff at AEDC on the program. The Commander strongly endorsed the program, and that means that support will come from all Directorates in the future. Perhaps AFOSR can use endorsements of that type to increase the size of the program in the future years. Congratulations on a well run program. On behalf of the staff at AEDC, I extend our thanks for all the help and prompt answer's forthcoming from UES and AFOSR.

Be more specific on holiday pay - eithers they get it or they don't - there has been much confusion on this.

Keep them coming.

Need 10 profs and 7 graduate students. High school program was also great. Keep up the good work.

It would be beneficial if we could be more involved in determining the arrival and departure dates of the participants. It would also be helpful if the focal point had more knowledge concerning the requirements for submitting pay vouchers/working times/allowances that can be made for a participant's personal time off during their visit relative to the 10 week requirement, etc.

Keep the basic work period at 10 weeks. However, consider authorizing a 2-week extension in exceptional, justified cases.

Reconsider your mechanism for paying the Summer Faculty. This was my most commonly heard complaint.

I feel it is essential to provide more time for our Laboratory people to evaluate prospective Summer Faculty researchers. They need time to talk to each other before a faculty researcher is chosen and before the researcher commits himself. This will assure a better fit between researcher and the intended research.

Good program. No suggestions for changes.

Just one. I feel that UES should not accept applications from Foreign Nationals for the Summer Faculty or Graduate Student Programs if they have no intention of accepting these individuals into the program. Their applications should be returned to them immediately stating why they are unacceptable. Also, applications received after the closeout date should be returned to the applicant immediately stating why they are unacceptable.

APPENDIX 1.D

PARTICIPANTS RESEARCH COLLEAGUES QUESTIONNAIRE & REPLY SUMMARY

1986 USAF/UES SUMMER FACULTY PROGRAM
EVALUATION QUESTIONNAIRE
(TO BE COMPLETED BY PARTICIPANT'S RESEARCH COLLEAGUE)

Name________________________ Title ________________

Division/Group ____________________ Laboratory ________________

Name of
Participant ____

A. TECHNICAL ASPECTS

1. Did you have personal knowledge of the Associate's capabilities prior to arrival at work site? YES___ NO____. If yes, where/how/what?

2. Was the Faculty Associate prepared for his project? YES____ NO___.

3. Please comment on his preparedness, competency, scope, depth of knowledge of subject area: ____________________

4. Please comment on the Associate's cooperativeness, diligency, interest,
etc.________________________________

5. In your opinion, has his participation in this summer program contributed to an increase in the Associate's potential to perform research? YES____ NO___. Comments:____________________

6. Did work performed by the Associate contribute to the overall mission/program of your laboratory? YES___NO___ .
   If yes, how?____

____

7. Would you classify the summer effort under the SFRP as research?
   YES___ NO____.

   Comment:____

8. Was a Graduate Student assigned to your group this summer?
   YES____ NO____. If so, did this enhance the research productivity?
   YES___NO____. Was it an administrative burden? YES___ NO____.

9. Were your relations with the Associate satisfactory from a technical point of view? YES___ NO____. Suggestions as to how they might be improved:____

____

____

10. Do you think that by having a Faculty Associate assigned to your group, others in the group benefited and/or were stimulated by his presence? YES___ NO____. Comments:_________________________

____

11. Do you feel that introduction to each other, together with the summer work experience and performance could form a sound basis for continuation of effort by Associate at his home institute?
    YES___ NO____. If yes, how?______________________________

____

    If no, why not?____

____

COLLEAGUE QUESTIONAIRE (Page 3 of 4)

12. One of the objectives of this program is to identify sources of basic research capability and availability to the USAF. On a scale of A to D, how effective do you think this program will be in that respect? (high) A B C D (low)

13. Also, please evaluate: A (high........D (low)

Opportunity to stimulate group activity	A	B	C	D
Professional association	A	B	C	D
Program administration	A	B	C	D

B. ADMINISTRATIVE ASPECTS

1. When did you first hear of this program?

2. Were you involved in the screening and prioritizing of the faculty applicants for your lab? YES___ NO ___. If yes, do you have any suggestions for improvement of the procedures used?________________

3. How do you rate the importance of the expense-paid pre-program visit to the work site? Not worth expense___ Convenient___ Essential___. Please add any comments:________________

4. Considering the calendar "window" of ten weeks (limited by varying college and university schedules), please comment on the program length. Were you as a team able to accomplish more than___, less than___, about what you expected___? Comments:________________

5. Would you desire another Faculty Associate to be assigned to you and/or your group/division? YES___ NO___. If no, why not?__________

6. Would you desire additional Graduate Students in this program? YES___ NO____.

7. Should the Graduate Students only be assigned to research <u>with</u> the Summer Research Faculty Member? YES___ NO____.

8. Should Graduate Students continue to be assigned <u>without</u> Summer Research Faculty supervision? YES___ NO____.

9. Other remarks:____

____

____

2056S

1986 USAF/UES SUMMER FACULTY PROGRAM
EVALUATION QUESTIONNAIRE
(TO BE COMPLETED BY PARTICIPANT'S RESEARCH COLLEAGUE)

A. TECHNICAL ASPECTS

1. Did you have personal knowledge of the Associate's capabilities prior to arrival at work site?

   YES - 80
   NO - 55

   If yes, where/how/what?

   National Council of Teachers of English.

   Dr. Hoffman's resume made it clear to us that he could benefit our program.

   Dr. Kolitz participated in the 1985 Summer Research Program and under a continuing grant during the year.

   A resume.

   UTSA Professor, University of Texas MDA.

   Supervisor.

   Met Dr. Quimby as a result of some reprint requests he sent me; later arranged meeting to discuss technical interests.

   As my professor several years ago.

   Previous employment as a student.

   Telephone conversation, pre-summer visit.

   Mr. Hasty worked in this area as an engineer prior to accepting his present faculty position.

   She had provided a resume.

   Resume and pre-program visit.

   Over the past 4 years, I have actively recruited applicants for this program. My first considerations are the needs of the laboratory and identifying an individual who I feel would most benefit from having worked in this lab. Having done this, I then review the literature for investigators who are currently publishing in that area and contact them to explain what the program has to offer. This is how Dr. Claiborne was recruited.

Dr. Hajela has visited and participated in technical discussions with me and other Branch personnel.

Resume and publications. Also pre-work visit.

Telephone and meeting at Eglin AFB.

Pre-summer visit was with a staff member who subsequently was transferred.

Multiple, lengthy phone calls and pre-summer visit.

Associate was recommended by his Department Chairman.

Information from his resume.

Resume. I had his thesis advisor at Cornell, and we chatted.

Worked with me last year.

He had worked previously for another group under this program. They supplied copies of his technical reports for my review.

From fellow research scientists.

Journal publications.

Fabian is a Professor at my alma mater.

Dr. Wooten is an internationally recognized expert in human color vision. I was familiar with his published research as well as his contributions to various research societies.

Meetings, discussions, presentations, research papers.

Personal contact, FJSRL, lab commander.

He had worked on this program before.

The quality of prior research he had performed for the USAF (Brooks AFB). His reputation among his peers.

A colleague of Dr. Fulk made me aware of his expertise in Artificial Intelligence.

Reviewed application form.

Prior cooperative work at Syracuse University - RADC supported.

He spent a 1 year sabbatical leave here about 6 years ago.

At OSU two years.

He was here last year on the Summer Faculty Program.

Literature publications.

Being a faculty member at WSU, Prof. Mehrotra visited me numerous times seeking research funds in area of ceramics where I learned of his interests.

Application.

Statistics literature. Also two year appointment as visiting professor.

In the past Prof. Battles has been associated with an AFGL SU support contractor during sabbatical leave and as a part time employee. He was assigned to work on some of our turbulence problems through analysis support. This arrangement had resulted in several publications in which we shared authorship.

I met Pat Gannon while I was a Ph.D. student at Colorado State University - he had been a formal associate of my major professor, Dr. Wu Cotton.

I have visited Dartmouth several times and have communicated with Mike on technical problems over the past several years.

In a minor way from colleagues who had worked with him on a previous summer faculty assignment.

Prof. Sturm worked here at AFGL last summer.

Division Director discussed his resume, and a member of our Division interviewed him during a visit on official business at his university and reported to me.

Through journal and conference.

Prof. Rao was known to us for a number of years. He wrote two well known books on optimization and finite element methods. He worked as a visiting scientist during the summer of 1984 when he was at San Diego State.

I have known Dr. Becus for a year. We visited University of Cincinnati to discuss research topics and Dr. Becus was a participant.

I have known Dr. Young for over a year.

Dr. Eastep worked in the laboratory in a number of occasions. He was an AFIT faculty member and familiar with our work.

I had knowledge of the associate's capabilities through journals, conferences and mutual acquaintances.

Dr. Doria has exchanged experience at the NASA, Langley Research Center. I have some knowledge of his work.

From previous participation in Summer Faculty Program and unsolicited proposal.

I had several long phone conversations concerning his research plans.

He worked with us last summer on the program.

Had obtained and read a copy of Ph.D. thesis.

Dr. Flentge has previously participated in the SFRP in this lab (POSL).

Prior efforts conducted at the Materials Laboratory at WPAFB.

Dr. Samimy was highly recommended to us by his colleagues. We were aware of his capabilities through his publications and technical correspondence.

Telephone interviews, visit to discuss select topic, telephone discussion, and letter proposal submitted before arrival.

Previous inquiry by Associate about research opportunities in AAMRL within his field of expertise.

Dr. Manicke met with AAMRL personnel prior to his arrival. His work was also represented in the literature.

I knew him as a professor at Wright State University.

2. Was the Faculty Associate prepared for his project?
   YES - 129
   NO - 6

3. Please comment on his preparedness, competency, scope, depth of knowledge of subject area:

   Dave Anderson is an excellent physical organic chemist, and while not having specific knowledge of energetic materials, was quickly able to apply his broad general knowledge to the problem at hand.

   Dave's principal area of expertise was in crystallography, however, he quickly picked up the knowledge needed to work in energetic materials.

   John had a very good background in quantum chemistry, in general and ab initio calculations in particular. He has had 18 publications in this area.

Nationally recognized linguist and educator.

Super credentials, lots of experience with expert systems and government work. A voluminous C.V.!

Dr. Kolitz was familiar with the Battle Management aspects of the program and with the data processing tools available to support his research. This knowledge was based on his previous work and current application for communications network and point to point connectivity.

General knowledge of the subject area and statistical techniques were excellent. Specific knowledge about job difficulty as it relates to performance (depth) moderate.

Top 1% of our three associates, he was the best!

Super job. Prepared research report for DARPA.

Excellent in all areas! Very knowledgable in solid state physics/optical measurement.

No prior knowledge of subject except mathematical background, very resourceful in accumulating data and method of approach.

Prepared by attending workshop on subject; highly knowledgeable in the subject area.

Very well prepared because of pre-arranged work assignment and prior reading/study.

Well prepared, exceptionally competent.

He has a fairly good background in the field of plasma physics; his work dealing with plasma/EM radiation interaction revealed inexperience or lack of recent experience in this particular area.

He had worked on this project in FY85 during its design therefore he was prepared to aid in implementation.

Good historical research skills - first time he worked in area of History of Science.

Dan was competent, prepared, and fully capable for the research project we gave him.

She thoroughly understood the subject area and was extremely competent.

Very good. Had asked for and received copy of computer model of laser thermal damage prior to beginning of program.

Pre-unit paved way for research in area before coming to RADC. Prepared himself for work in a new area with vigor, enthusiasm, good results.

Associate was highly competent and innovated. Research objectives were discussed during pre-program visit. Associate read reprints of research articles and reviewed literature.

Research objectives were discussed during pre-program visit. Associate read journal articles on subject. Associate was very competent and learned quickly.

Extremely good since he has been working on this project for some time.

This summer project was a continuation of an on-going effort.

Dr. Hung was ideally suited for the problem we asked him to investigate. He has an extensive background (including teaching graduate courses) in mathematics. He recommended a new approach which provided significant new insights.

Selection of a research task was based on his competency to accomplish the research. Professor Jones was skilled and experienced in the application of the mathematical, computer and engineering sciences.

Knowledge of communication protocols was very good.

Dr. Hadlock was well-prepared to undertake the project he was assigned.

Participant immediately got to the essential aspects of the project and provided to be very productive throughout.

He was very well prepared and very capable. The project got off to a good start and really accomplished more than expected.

Quite simply, Dr. Claiborne's preparation was so complete that she actually began collecting data the day following her arrival. As for the scope and depth of her knowledge, it should be noted that Dr. Claiborne came to us from the pre-immanent laboratory in the country in this particular area of research; hippocampal neuroanatomy. Her recent publications on this subject further confirmed the fact that she possesses a particularly sophisticated degree of expertise.

Extremely well prepared with deep hands-on/book knowledge of work area. Extremely competent.

Well prepared, expanded prior work: directing graduate student on cavity flow. He is considered a specialist in this technology area.

Worked in his area of specialization; performed very well; scope expanded to entire USAFSAM at request of Commander (study of computer needs).

A new area for him; he brought/bought books, read intensively; worked intensively with a small group; performed very well.

Very qualified, came prepared, and spent plenty of time on project.

He has been working in neural modeling for about a year, and is gaininng competency in a very esoteric field.

Dr. Keener's background is differential equations. He had no prior experience in optimal control and had to spend several weeks "boning up".

Prior experience with NASA was useful to his work here. That experience was in the area of system reliability and component part availability.

He seemed to have excellent competency in his field, and this contributed to his success during his stay here.

Dr. Moorthy was well prepared in Computer Science. However, human factors is a relatively new area for him. He chose to work in human factors while here.

We were interested in working with Dr. Boggs because of her knowledge of decision-making research from a business perspective. We found her very knowledgeable in this area.

Dr. Loy was very knowledgable in the area of computer business games.

He is very knowledgeable in the theories and methodologies of software engineering.

Very well prepared! He immediately applied his knowledge of new theoretical technique to our needs.

Excellent, had completed further study from last summer's work.

He teaches related subjects at the University of Florida in Operations Research. His rapid grasp of the problem indicated he was well prepared for the area.

Dr. Day's previous research has not been in the main stream of Artificial Intelligence (AI) - he is attempting to make the transition. I believe that Dr. Day has developed this past summer the in depth AI knowledge required to do credible research in AI.

Dr. Whidden was willing to work on a number of projects, however, he had not formulated his final plans until his arrival at the USAF School of Aerospace Medicine.

Had more than acceptable capability.

Dr. Moyer has world acclaim in the field of microbiology of human tumor cells.

Dr. Chastain is one of the nation's leading researchers in the aspects of attention addressed by the project.

He was familiar with the general area and used his pre-site visit to adapt the issues to the flying domain. He had no prior knowledge of issues relating to flying training research.

Several detailed discussions were held with Dr. Wooten prior to his arrival at Williams AFB. Dr. Wooten has been involved in research directly related to that performed here and his competence and depth of knowledge in this area are unequaled.

Fabian is an expert in fuzzy set theory and damage diagnosis and was well prepared to focus these talents on our damage paradigm.

Due to uncontrollable circumstances, the subject area was changed at the last minute. Dr. Englert had sufficient general laboratory skills to adept to the new subject area.

Dr. Cheng conducted a literature search prior to his arrival, as well as visited researchers in the field. Dr. Cheng has a background in molecular physics which was needed for this project.

80% prepared (could have been slightly better prepared) very competent, depth and breadth of knowledge excellent - field of research in closely related area.

Very prepared, very competent, had intimate knowledge of subject area.

Very prepared, highly competent, and well versed in a broad range of areas that contribute to the topic.

Exceptionally well prepared. He is an expert in the blood brain barrier and is well published in this area.

He holds a Ph.D. in Chemistry with Industrial Hygiene training, is interested in the subject, and did some background reading on the subject before arriving.

After his initial visit, Dr. McDonald had a chance to research the literature and was better prepared for the challenge at hand when came back for his 10 weeks at the lab.

We completed a literature search prior to his arrival. He was also briefed of what we wanted during his initial visit.

She was well prepared to research a subject of which she had little knowledge. She competently sought out and organized information in an area where she would have little reason to know much at all.

Very knowledgeable in both image processing and artificial intelligence tools and techniques.

Limited knowledge of image processing, no knowledge of image algebra.

He is a first rate designer of semiconductor processing equipment and research equipment.

Excellent.

Dr. Chung is well qualified in all aspects of thermal management and heat transfer.

Dr. Patel's extensive background in immunology more than adequately prepared him to participate in the summer program.

He had specific experience in molten salts and a good general knowledge of physical chemistry.

Dr. Jones arrived with no set project or laboratory to work in. Her work in the past has been structural, involving the electron microscope, and not the physiology or biochemistry (functional) fields that I work in. This was a career broadening project for her, giving her an overview of potentially useful biochemical techniques and their applications.

Very cooperative individual.

Associate talked with personnel in lab or his pre-program visit and therefore was well prepared for the summer program.

He attended a workshop on ceramic composites and began a very extensive literature review prior to his arrival.

He was very well prepared and interested in our parallel (symbolic) processing research. His background in the design on parallel system was very helpful.

Because of his prior knowledge in thermodynamic calculations, he required minimum preparation for the task he was assigned to do. He demonstrated an exceptional depth of knowledge of the subject area.

Had knowledge from literature.

He has worked on this particular topic of Raman states of doped Si and is well aware of the literature and has sophisticated facilities.

In depth knowledge in general subject area. Developing familiarity with topic.

He has been working in x-ray topography for several years as an active researcher.

He requested and was sent published papers and references on the areas in which he planned to work. He made a pre-assignment visit to discuss the effort and prepared well for his research.

He has sound basic knowledge on signal processing.

Dr. Greene was fully prepared for his project. He is highly competent and has a very profound knowledge of the subject area.

Application of basic skills to new problem area was outstanding.

Dr. Tomiyama was extremely knowledgeable in the subject area. He has worked in the field for at least 10 years.

Very good.

Dr. Zobrist was well prepared to investigate the automated CAD software due to his extensive professional experience at University of Missouri Computer Science Dept. Dr. Zobrist greatly extended our knowledge by his in-depth coverage of Petri-Net theory and applications.

Had researched subject material before hand and came with both the knowledge and background required to start right in.

He has excellent knowledge of the subject area of turbulence modeling, and the specific applications areas of the different models.

Excellent background. The selected research topic was a direct follow-on of work he did for his Ph.D. dissertation.

Dr. Gupta and I had been collaborating by mail and telephone. We were very ready to get down to work together.

He was sufficiently well-versed in both dynamical meteorology and computer programming for the project he proposed.

Prof. Battles was well prepared to assist us in a number of problems in atmospheric turbulence and optical effects. He is competent in both the scope and depth of atmospheric optical effects as evidenced by prior publications and the results of his efforts this summer.

He was thoroughly knowledgeable with all aspects of his project.

Well versed, well prepared, very much at home in the field.

Pat visited AFGL approximately 2 months prior to his summer term. We discussed potential mutal interests, and I gave him several papers of ours. He took them home, read and assimilated the material and wrote an excellent and very "insightful" work plan.

He is a competent experimental plasma physicist. Over the past summer he has been able to interact with us on a wide range of subjects.

He was quite familiar with work and extremely competent.

Dr. LoPresto had extensive experience in observing solar spectral lines on other telescopes. He was able to make significant observations at Sac Peak within a week of his arrival. He rapidly reduced these observations.

The Associate is knowledgeable in mathematics but not in meteorology. However, the program was tailored to take advantage of his competency and perspective in mathematics.

Fully competent, well prepared.

He continued his research on the problem he investigated last summer - as a result he was well prepared.

Our specific work was entirely new to him but he had adequate general background to build on.

He has been working in this area for six years and is well known. He formulated his summer problem within one week after he had technical discussion with me and others. He is also excellent with computers.

Associate made two visits, before the summer program started, to familiarize himself with the research task and get acquainted with the facilities and on-going research tasks. Most of his experience was in subsonic aerodynamics, limited experience in supersonic/hypersonic aerodynamics.

He had reviewed applicable reports, letters and the like that provided information on aircraft transparencies, test methods, and durability problems.

Dr. Yip grasped the problem who were concerned with and knew how and where to start on the problem. This was really an extension of work he had done earlier.

Dr. Rao's extensive teaching experience, his keen interest in working in the area of control structure synthesis and his preparation for this summer work were evident from his immediate work progress.

Dr. Becus was already interested in the area of dynamics and controls and he looked at the problem of structure control synthesis before coming to the laboratory. He was very well prepared.

We have indicated to Dr. Young our interest in coupled thermal-mechanical problems and optimization. Dr. Young is already actively involved in these areas and collected excellent ideas for the project.

Dr. Eastep was quite well prepared in the area of structural dynamics and applying his knowledge to structure control synthesis.

Dr. Yousuff is considered to be one of the foremost researchers in the field of model reduction. His overall knowledge of the technical discipline, system theory, is excellent.

He is reasonably knowledgeable in computational aerodynamics but is exceptionally able in computer operation.

Dr. Murty's background and expertise in the research area allowed him to immediately begin his technical work.

He was well prepared in control theory and dynamics area and had begun studying the flying qualities referenced suggested prior to his arrival.

He proposed a research problem in advance; it was a problem which he had been considering already, and about which he was quite well informed regarding the literature. Fortunately, it was one which also was of concern to us.

He had extensive knowledge of the research literature on vigilance. He had also completed the design and programming of studies to be run at HRL.

He had written and visited to coordinate his summer activities and acquire background information.

Dr. Chen had an indepth knowledge of the subject area and was well prepared to perform the research.

Reasonably so - was not used to emphasis on producing real numbers and company with experiments. Chemical kinetics outside his thesis etc., weak.

Excellent in all regards. Previous experience prepared Dr. Flentge well.

Dr. Ho is an exceptionally well prepared physicist with wide ranging knowledge of power related materiails. He is well connected with scientific leaders and is up-to-date on emerging technologies. Dr. Ho has more than 80 technical papers.

Dr. Samimy is a very capable research scientist. His knowledge of fluid dynamics, instrumentation in particular LDV system is outstanding as a result very little time was required for his orientation.

Associate was reasonably well prepared but lacked mathematics background that would have been beneficial.

Dr. Manicke is extremely knowledgeable in his area.

Excellent background in human head/neck mechanics. Fully prepared to pursue chosen project when arrived.

He is a very hard worker. He did an excellent job for his summer position. He is extremely competent and by the end of the summer had developed a great deal of knowledge in the subject area.

Dr. Tacker's depth of knowledge in artificial intelligence and preparedness to perform the research planned was considerably less than I expected.

Accomplished extensive background reading in areas of teleconferencing technology and AAMRL C^3 programs. Forwarded summer plan and schedule prior to arrival.

Good knowledge of general area, well prepared and competent.

4. Please comment on the Associate's cooperativeness, diligency, interest, etc.

Dave, in addition to the planned work in energetic materials, helped supervise an undergraduate in writing a complex program for running our EPR spectrometer with an IBM AT.

Dave worked on several projects during his ten weeks, spanning both physical organic chemistry and analytical chemistry. He was always willing to work on any aspect of the lab's research problems.

John applied himself not only to ab initio studies of energetic materials, but to learning the area of semi-empirical calculations. In both areas he has been very productive.

Terrific.

Volunteered to work weekends! Went TDY with project officer. Worked well with colleagues and users.

Dr. Kolitz works well independently and contributes to the organization by providing technical advice and contributing current information and literature on subjects related to our work.

Excellent!

Top 1% again.

Most cooperative, diligent.

Excellent. I was very unhappy to have him leave when his tenure expired - would hire him full time were it possible.

Excellent.

Very cooperative.

Couldn't have been better.

The associate was very cooperative and showed a great interest in theoretical investigation of plasma/EM relationship.

Very cooperative, high interest, stayed on job. It is a pleasure to work with Doyle.

Superb.

Dan did much more than was expected of him and in fact worked nights and weekends towards the end in order to finish before he had to return to LSU.

Probably one of the hardest working and dedicated people we've ever had here at the LMC. She was interested in the material and pursued it at enthusiasm.

Couldn't ask for more than was provided in such areas.

Associate was very interested in the research. Worked continuously and took work home. Couldn't ask for a better person. Other's in lab felt the same way.

Associate was very cooperative. Couldn't ask for a better person. Very interested in work.

Cooperativeness, diligency and interest were very good.

All was very good.

Dr. Hung was highly motivated toward resolving the problem given to him. He worked very well with all of us in the office and also with personnel in AFLC/LOC.

He exhibited the best of attitudes. We were highly pleased with his interest, cooperativeness, diligency and self-motivated technical involvement.

Excellent.

Dr. Claiborne provided an exemplary example of how to efficiently execute a complex research task in an unreasonably brief period, without imposing upon any of her colleagues to accomplish this.

He worked diligently on the project and with great interest.

Participant worked long hours with full enthusiasm, interest and motivation. Also inspired associates within the center to participate in discussions on the subject matter.

Extremely cooperative, very hard working, and expressed keen interest in the technical aspects of the job.

Very friendly and cooperative. Worked effectively at high speed with enthusiasm.

He is particularly in one of our critical technology areas which is internal carriage and release of weapons from high performance aircraft. He is submitting 2 AIAA papers as a direct result of his summer work.

Completely committed.

Totally committed to the task at hand.

Easy to work with.

Excellent.

He was very interested and cooperative, especially since his area of interest coincided with ours.

Extremely cooperative and anxious to contribute to our mission. Very easy to work with and to discuss technical matters with. Hard worker, making full use of the short time he had available with us.

He was very cooperative, worked very hard, and maintained a high level of interest during his entire stay here.

Dr. Moorthy was very cooperative. He was a diligent worker who stayed with the task and worked very hard.

Dr. Boggs was very interested in our projects, easy to work with and very cooperative when anything was requested of her.

Dr. Loy was very interested in Air Force Command and Control, very diligent in his work and easy to work with.

He is very interested in the work here and sees many ways that he can assist us.

The highest.

Excellent - self directed - needed little supervision.

Dr. Sivazlian responded directly to our request. There were no side issues or discussions on alternate approaches. He expanded upon our ideas and presented them for our approval.

Dr. Day was extremely cooperative, worked hard and was very much interested in our research. He was a pleasure to have in our group.

Dr. Whidden is very cooperative in all his work here.

Outstanding.

Dr. Moyer is a very pleasant person to work with. He is very determined even in the face of unsatisfactory conditions.

Dr. Chastain was very cooperative and hard working. He was eager to share his extensive knowledge and was very easy to work with.

Dr. Hass was exceptionally capable of putting together his research equipment, arranging for the necessary support. He worked extremely hard and managed to complete quite a bit of work with little burden on other staff.

Outstanding on all events.

Fabian was extremely dedicated, working evenings and weekends despite the emotional trauma associated with the death of his father this summer.

Dr. Englert was quite willing to participate in the project, even though it was not the subject area he had anticipated.

Dr. Cheng was quite enthusiastic and projected a very positive attitude.

Very cooperative and diligent, extremely interested.

Very cooperative and personable, extremely hard worker.

Exceptionally cooperative and diligent.

Dr. Houk is most cooperative and has become a professional associate as well as a personal friend. He seems to be interested in continuing this work.

Dr. McDonald was extremely cooperative. He not only did his research but helped us with routine problems in his spare time.

Dr. Rascati has been a pleasure to work with. He demonstrated exceptional cooperativeness, diligency and interest.

Totally cooperative. Worked long hours and was obviously interested in learning.

Dr. Fulk was very positive in all areas of his summer's work.

Dr. Rice was very positive in all areas of her summer's work.

He pushed very hard during the time he was here to complete the system fabrication in the machine shop.

Excellent.

There was some difficulty in communicating. Dr. Chung had difficulty workin in our system, preferring to directly deal with secretaries, machine shop personnel, etc., making it difficult for us to run our own shop.

Dr. Patel is very courteous, cooperative, diligent to spend long hours to complete projects and maintain a high degree of interest in bringing these projects to completion.

Associate was extremely cooperative and very interested in seeking out areas of mutual interest.

The best.

She was highly cooperative and willing to work long hours in the laboratory and library.

Very conscientious - shows great interest in his work. Gets along well with professional and unprofessional staff.

Very cooperative, hard working, broad interests in composite mechanics.

Again, as above, because of his background in parallel processing he was able to contribute to our research.

Gopal Mehrotra is highly enthusiastic, cooperative and worked well with all the scientists and engineers in the laboratory. He performed well and did a careful study while in the laboratory.

Superior.

Dr. Schneider is a very fine person with whom to work and expended great drive and motivation on this work.

Very cooperative, diligent, interested, etc.

Dr. Stock was an extremely easy person with whom to work, his enthusiasm showed in his hard work and patience in explaining the techniques and results to others.

He was extremely interested and easy to work with.

Excellent.

Dr. Greene was very cooperative, highly diligent and was very interested in the subject of his research.

Top rate. Working with Dr. Grosky was stimulating, motivating and highly productive. I hope to continue this relationship in the future.

Dr. Tomiyama is a hard working conscientious researcher. His comments and perspective were respected by all within our group and we all benefited from his enthusiasm and interest in our projects.

Excellent - communicated well, was very interactive.

Dr. Zobrist was extremely interested in our ADAS software and was a constant user for his time with us. His diligence lead to several improvement suggestions that are being implemented.

Professor Kung was very cooperative, diligent and interested in accomplishing his stated objectives.

The associate was very willing. He asked intelligent questions about optical applications of the work.

Couldn't have been better. He fit right in. Always willing to talk and listen to others. Spent many an evening and weekend working on the problem.

A full professional who had the work as his total focus.

A full two-way cooperation with in-house scientists and frequent evening and weekend workings characterize his ten-week stay here.

Prof. Battles demonstrated a keen interest in our immediate problems and worked very diligently on them. This directly resulted in our completing anlaysis of data from a recent large experimental program in a very timely manner.

All aspects of Dr. Christian's interactions with our laboratory were positive.

It was a pleasure to work with Don, cooperative, adaptable, hard working and cheerful.

High cooperative and diligent - a real pleasure to work with. In addition to pursuing some of his own interests, he helped us get a position of our numerical cloud model working.

He is highly motivated to succeed in his field and very much interested in his work.

Very cooperative and hard working.

Associate worked well with both the observing and scientific staffs. He participated in our staff reports and gave a colloqium on his work.

Very cooperative, competent and showed strong interest.

Cooperative, worked well with laboratory personnel, diligent, attentive.

Dr. Sturm was highly cooperative. He worked hard on the problem.

His spirit of cooperation, diligence, interest and ability to work harmoniously with others were very high.

He was extremely cooperative and was always willing to listen and comment on various technical problems even though those problems are outside the scope of his summer work.

Associate was cooperative in every way, worked quite diligently and showed a great deal of interest in the project matter. Associate worked to a large extent, independently of the sponsor.

Very high.

Very diligent and interested. Through frequent discussions he quickly acquired a good working knowledge about the specialized areas applicable to aircraft transparencies, while also providing information to a AFWAL personnel concerning statistical analysis issues.

Dr. Rao was extremely cooperative and forthcoming in discussions, presentation of seminar and consultation in the field of expertise - optimization and finite element analysis.

Dr. Becus is cooperative and is more than willing to work with members of FIBRA and others.

Dr. Young was persistent and cooperative in spite of our problems with our computers during system expansion.

Dr. Eastep is extremely cooperative and always ready for consultation particularly in his specialty, aeroelasticity.

The Associate was cooperative during his stay. He was keenly interested in developing a good working relationship with the members of the research team.

He is courteous to members of our group and the feeling is mutual. He has shown strong interest in his work here.

Dr. Murty was energetic and hard working. He enthusiastically pursued his research. He was cooperative in taking direction, as well as being very capable of independent analysis.

Once the project was agreed upon, Dr. Pujara was very cooperative and enthusiastic. He was very thorough and learned quickly by on-the-job contact with members of the Flying Qualities Group.

Jorge blended into our branch beautifully! He carried out his project very competently, was quite willing to spend time consulting us about related matters, and with his graduate students, conducted an excellent workshop for lab personnel on his research.

He was very dedicated to his work.

Very cooperative and self-motivated to produce a useful research product.

Dr. Chen's interest remained high throughout the research period and he diligently performed his tasks with an excellent spirit of cooperativeness.

Associate was diligent and interested in new areas however academic pace seems more leisurely.

Excellent work attitude and performance. Could not have been better.

Dr. Ho is extremely cooperative and has diligently formed alliances with Materials Laboratory personnel to permit us to fully utilize their extensive facilities. Dr. Ho has presented problems of the Aerospace Power Division to the Materials Lab personnel that he has gained the confidence and voluntary consultation time to great effect.

He is a very diligent, cooperative and most importantly interested in the research effort. His knowledge together with his willingness to perform under all conditions have really been an asset to our program.

Cooperative.

Was very interested, cooperative and worked very hard.

He is very cooperative, highly motivated, and extremely diligent.

Most cooperative and interested in pursuing task. Worked evenings and weekends.

He was cooperative in working on his project as well as other problems we have at our laboratory. He was diligent in his work and showed great interest.

Highly cooperative, worked long hours on extensive software analysis and documentation.

Tops! Best I've seen. Got everyone in my group involved and excited about his project. Made extensive contacts with other agencies and contractors to track down related projects and equipment.

Very high in all categories, very highly motivated and skilled, diligent. A good experience for all.

5. In your opinion, has his participation in this summer program contributed to an increase in the Associate's potential to perform research?
YES - 132
NO - 3

Comments:

The program has provided hands on experience with EPR spectroscopy and an introduction to energetic materials chemistry.

Dave has had a chance to work both in analytical chemistry/chromatography and physical organic chemistry/EPR spectroscopy and has been introduced to the area of energetic materials.

He has learned a great deal about semi-empirical methods and has been exposed to the areas of energetic materials and tribology.

Dr. Kolitz's expertise is utilized not only by the Electronic Systems Division but also by the MITRE research engineers who support our program.

Subject content broadened Dr. Lance.

He learned a lot about new glasses and optical materials. We (AF) learned a great deal about optical spectroscopy of rare earths.

Methodology now in place to do more complicated problems.

Became familiar with the Air Force's problem.

Gained several contacts.

The practical experience gained here will be of great benefit in the classroom.

His exposure to a number of applications for expert design was beneficial to him.

He is now in a position to perform work and research in Maintainability that few are able to perform.

Broadened his background.

Associate gained new insight in a new area of research.

He worked on a frustrating real world problem, which was not yielding to conventional textbook techniques. I think his effort benefited him as much as it benefited us.

He acquired knowledge of current research in Distributed Operating System, Fault Tolerance, and distributed data bases.

His involvement into the Armament Division's mission area was a motivating and thought producing work assignment. Extremely good experience for further research.

It is my opinion that the Associate came to this laboratory with an already fully developed potential. Her level of productivity over the past several years confirm this. However, I do believe that as a result of this program it is far more likely that she will go on to perform research in areas of interest to the Air Force.

The project is relatively new to Dr. Hadlock but given more time, he could have produced a nice research project.

He obviously learned a lot from the people in the Branch with whom he worked and, in turn, made a very significant contribution.

He learned a number of techniques useful in his academic research program.

He participated in a workshop in internal carriage and release which provided an excellent overview of related industry and government activities.

Repeated his dissertation in a real world environment.

It opened up a new area of interest/specialization to him.

He is planning on applying for a mini-grant.

Dr. Keener is now aware of some of the important problems associated with advanced guidance laws.

Prof. Scott now has a clear understanding of our work and how it fits into the overall Air Force program to develop conventional weapons. Subsequent work terms here would be even more valuable to us, because of his experience in this field.

As I understand this question, the Associate's ability to perform has not been changed by the summer program.

He is much more qualified in the area of human factors.

While Dr. Boggs was here, we introduced her to psychological research in decision-making. We feel (and she agrees) that this opened new vistas for her.

Dr. Loy was exposed to psychological decision-making research and Air Force decision-making. Both should help him in his research.

He has pointed out deficiencies and suggested ways to correct them.

Further understanding of USAF issues/needs.

Exposure to new community of workers at Optical/Microwave Interface.

Dr. Sivazlian's talents were likely not taxed in this work. We hope that the probelm has stimulated his interest and that he will continue research in this area.

Dr. Day addressed some fundamental unsolved issues in Artificial Intelligence. The results he accomplished this summer provide an excellent base to continue his research.

Associate worked in a relatively new sub-field.

Dr. Moyer has had no experience in biophysics and/or technology.

His participation allowed him the opportunity to relate his research interests to those areas in the flying domain. He does not have access to a flying program at his university which will limit his ability to pursue directly the issues that he dealt with this summer.

He has gained insight into the Air Force problem of assessing damage to protective facilities. He should be successful in acquiring his own grants with this experience.

For the fact that Dr. Cheng has become better acquainted with experimental techniques.

Obtained new insights into aerodynamic research programs of interest to the Air Force. Broadened his research base.

Gained even deeper appreciation and knowledge of subject area.

He has now had some experience with method of moment solutions and the solution of integral equations.

Especially in surgical manipulations that enhanced his abilities to perform basic research which demands surgical expertise.

Dr. Houk is a professor of Chemistry and already is a qualified researcher.

Although he was a highly qualified individual, I think he was happy to obtain the new experience.

A Ph.D. should already know how to perform research. An "increase in potential"?

Gave her a much better view of the requirements for a successful grant application.

Although Dr. Fulk came well qualified, his capabilities grew because of the practicality of his work.

In the broad area of image processing and the special structure associated with an image algebra, Dr. Rice's research capabilities grew because of the practicality of her work.

He laid the ground work for an epitaxy system that will be used for GaAs and other compound semiconductors research at the University.

While participating in this program, Dr. Patel was able to become directly involved in the development of two additional immunology laboratory techniques which he thinks will have further application in his laboratory endeavors in the future.

He was exposed to organic electrochemistry, an area he had not been familiar with earlier.

It has given her some understanding of how functionally oriented research is approached. It should broaden her base of research to go beyond simple structural studies.

Associate was apparently encouraged to complete his doctoral studies after conducting research here.

His contact with our mechanics people at MLBM and AD tech and our material scientists has given him new insights into research issues and requirements.

He is interested in the pursuit of further research in symbolic parallel processing and pecularities associated with this new field.

Much is learned from the summer faculty program that one is unable to put a value figure on it except saying that it is the best thing next to visiting scientist program and must be continued.

It gave him access to materials and knowledge of applicability of the measurement to AF problems.

His background was mainly in non-semiconductor materials, so he gained experience with GaAs and Si bulk and epitaxial Si.

His participation in the program provided him with the opportunity to work on the leading edge of an important technology with current state of the art equipment and computer support.

To know some applications to RF receivers.

We have identified and solved many potentially very useful research problems in advanced camera calibration and robotic vision.

During the summer Dr. Tomiyama explored many of the applications of his research area. He was introduced to the concept of "tactical weather intelligence" and how applications of his research area are an integral part of that concept.

By introducing Dr. Zobrist to the integraded method of CAD, he will be able to apply his designs for distributed parallel processing in a more efficient manner.

What is read in books is not always what is found in real life. It is not as simple as on paper.

The optical applications of turbulence models is relatively unique and offers a challenging research area.

That's a tough one to answer. I'm not sure that it increased his potential, but that's because he was fully competent to begin with.

Dr. Gupta is an established researcher, however, this summer experience improved his appreciation of Air Force research needs.

By the exposure to a global spectral model and by the experience of working with global data.

I think the associate's exposure to a research facility outside the University environment has given him first hand overall experience in larger Air Force research programs.

The cooperation was near ideal where he learned several important laser techniques from us and we gained considerably from his previous knowledge.

We hope so and believe that it did. He has ideas for follow-on work and we went to explore further.

After the heavy teaching and administrative load Pat has been carrying, he wants to get back into some research. I think this summer gave him some "momentum" toward doing this research.

I think that we have been able to provide some new perspectives to his work and, as a result of our interaction, he has gotten some new insights into the subfield of collisional plasmas.

Associate was exposed to several new instruments that should enhance his studies of spectral line variations.

The exposure in meteorology and interactions with other Summer Associates have undoubtedly increased his research potential.

Has become acquainted with new computer systems, language and techniques.

In the course of his research, Prof. Sturm mentioned a new analytical technique.

Since he was exposed to the bigger picture, his future research will expand and he will work on practical problems.

I think his exposure to the programs existing in AFWAL and his participation in a supersonic/hypersonic research effort has improved his capability in this technology area.

He has become familiar with the pertinent issues effecting aircraft transparency durability and applicable laboratory test methods.

It certainly gave him an insight into what the practical problems are as we see them.

Very much so. He gained substantial insight into the research topic control-structure synthesis.

Certainly that was my conclusion after discussions with Dr. Becus.

I am firmly convinced this is the case after talking to Dr. Young.

Yes, definitely so. This was the conclusion after several discussions with Dr. Eastep.

The associate has a deeper understanding of problems confronting the USAF.

Unfortunately, he will not be able to continue when he returns to his university.

I believe that Dr. Murty gained the capability to envision how exploratory research can be transitioned into development and ultimately a product.

Dr. Pujara learned quite a bit about the relationships between airplane dynamics and flying qualities, as shown in his final report and by his own admission.

He appeared to benefit from discussions with HRL personnel and he was able to conduct studies that would have been very difficult to accomplish at other research facilities.

He has gained useful experience and exposure to the specific research needs of the Air Force.

He was exposed to equipment, techniques and ideas that could be of value for future research.

It certainly broadened his scope and I hope interests.

Dr. Flentge's work has increased his exposure to tube evaluation methods. This information is invaluable in the area.

The potential collaboration of Dr. Ho with personnel at the Aerospace Power Division and the Materials Laboratory has greatly expanded our opportunity to conduct joint research within the laboratories.

He has become interested in program that can contribute to our Laboratories mission.

He gained considerable insight into concepts of spatial kinematics of human motion.

He has gained a greater insight into the realities of experimentation employing human subjects.

The participant gained much from the experience at the lab and should be fully capable of carrying on in some research area.

Dr. Rattan advanced the state-of-the-art in the area of g-suit valve design.

But less than expected.

Associate now has excellent grasp on our research plans and how his research area dovetails.

He picked up some good information in our Lab, also improved his data collection techniques and knowledge of cognitive area.

6. Did work performed by the Associate contribute to the overall mission/program of your laboratory?
Yes - 131
No - 4

If yes, how?

Dave both worked on an on-going project in the lab, making good progress on its solution and improved our EPR facilities.

Especially in the area of analytical chemistry Dave provided research support to projects of prime interest to the lab, but for which we had insufficient manpower to explore.

He worked on on-going research interests, providing about half the total research effort in tribology.

The problem of connectivity among the many BM/C^3 assets is a large one. Dr. Kolitz provided an objective generic approach for achieving this.

Explored an area with potential promise for which we did not have the staff.

Right on. Demonstrating its systems!

AI initiatives - better definition.

A highly efficient means for converting IR to visible light in fluoride glasses was evaluated.

Gave us method of approach to a class of problems.

Determination of experiment.

Provided a ten-fold increase in computer program speed.

The research was fundamental, and therefore immediate benefits are limited.

A fresh look at the implementation software and hardware-software interface was extremely helpful.

His work provided important background material on the Strategic Defense Initiative (SDI).

The model Dan built will serve as the basis for many future projects.

A tool is needed in the Air Force to assess our ability to deliver fuel to aircraft in war. This tool didn't exist before. Prof. Lewis worked on its development.

Fundamental flow in calculating thresholds for multiple pulse flashes corrected.

Associate's work contributed to several breakthroughs in research. These will be followed up with grants.

Research has resulted in a publication to be written by the associate. There is also considerable interest in continuing his research.

His independent analysis will prove the basis for the USAF position in a USAF contractor dispute.

His research will be used in near future developments, within the Directorate to enhance mission support capabilities.

By identifying protocol services necessary to support distributed applications.

Dr. Claiborne's research project was agreed upon during our initial discussions concerning the program and prior to her application. Therefore, the research she proposed to perform was designed to tie in directly with our projects stated objectives.

Dr. Hadlock has formulated a new approach in our math modeling work.

Findings in his report will have a major influence on the conduct of a center contractual effort.

Formed a foundation upon which the laboratory can build to make the hydrocode analyses more efficient and effective.

One of his projects resulted in a new analytical technique that was used to upgrade/prove.

Better understanding of fluid mechanics associated with cavity flow.

His final report is being studied by USAFSAM senior managers at this time.

His overview of the program and topological analysis were invaluable.

Developed a new simulation capability.

It stimulated interest and discussion in an area we are still learning about.

His work has identified an area of our vulnerability methodology that needs broadening because it did not consider all possibile probabilistic outcomes.

The work familiarized us with the decision-making research in the business area.

Work was done that could not have been done without the extra manpower provided by the Associate.

Dr. Moorthy made a number of recommendations for Laboratory programs. However, his actual contributions were limited.

Dr. Loy's work allowed us to become familiar with various computer games that support decision-making research.

It helped us understand both how to manage software.

Introduced awareness of applicable new approach.

Furthered important research.

He has expanded our capability to evaluate weapon technology in terms of aircraft sortie effectiveness measures of merit.

Dr. Day addressed truth maintenance and learning in large dynamic knowledge-based systems. These are fundamental issues which are of major concerns to our group.

Although I had not seen his final results I understand that they will define the role of hyperbaric oxygen in burn shock.

Was associated with pilot studies on solution to heat stress problems.

It has brought into the program a new tool.

It advanced research goals in the area of visual attention by ruling out static clutter effects.

He performed a preliminary research project which will be pursued here because it revealed an area of possible importance to training and equipment/display design.

The research performed was directly related to on-going projects concerned with the evaluation of color usage in flight simulation.

We are preparing two international papers on Fabian's work; an internal code is being modified according to Fabian's work.

Mission of FJSRL is to do basic research.

Developed new insight theoretically and incorporated new analysis technique.

Provided in-depth analysis and new insights into aerodynamic data.

He looked at some new radiations that we are considering for use with printed circuit arrays.

It allowed us to develop a chronic catheterization technique and animal model that we are now able to use in other investigations.

The research, if completed, could result in a procedure not presently available. Dr. Houk's work this summer has greatly facilitated this research.

Absolutely, increased mission capability, both in the Giardia project and George AFB problem.

By collating information scattered throughout the literature and previously unavailable in a collected form.

Greatly contributed to our image processing, LISP, FORTRAN interface.

Provided close review of two Image Algebra approaches.

We now have an ultra clear molecular beam deposition system to use in our 2306 program (in-house).

Computer modeling of two phase heat transfer.

Preliminary work was accomplished in new heat transfer techniques.

Dr. Patel was directly involved in developing an anti-cardiolipin assay which we will continue to use in our laboratory.

Characterization of reactive Fridel-Crafts intermediates.

Dr. Jones assisted in the modification of a cell membrane preparation technique.

It was closely related to our interest.

Associate applied Infrared Spectroscopy to several critical research activities in Branch.

We need micromechanical models for high temperature materials. His work will lead to development of such models.

By complementing our existing resources and aiding in the design of our system.

It pointed us to a right direction as far as high temperature ceramic - composites program is concerned.

Evaluated various synthetic approaches to high temp. resins.

It explored defect energy levels that affect IR detector performance.

Enabled me to pursue additional work which would otherwise not have been done.

This is the first detailed structural data we've had available on the specific materials we're evaluating.

His research effort provided a much better understanding of the structure property relationship of functional fluids.

He showed several problems we did not have time to work on.

Introduce new approaches to signal processing.

Dr. Greene worked in an area which is of great interest to this lab.

Work on unified camera calibration algorithms will contribute to all laboratories requiring this technology. Specifically it has had a major impact on our in-house project.

Dr. Tomiyama performed modifications to a part of the Tactical Decision Aid computer code which permit the code to be operated in a far simpler implementation.

Gave us insights into a new transistor structure.

Use and comment on all ADAS software.

The area which Prof. Kung is addressing is very important in the area of Integrated Switching.

Specific recommendations were made regarding suitability of turbulence models available.

The research topic was a problem that we have been concerned about but haven't had the manpower to address yet.

A new statistic was developed that is very important to the laboratory.

By completing a computer program which decomposes kinetic energy into a rotational and a divergent component.

Prof. Battles completely familiarized himself with our computer systems, and then was able to use these systems as tools for assisting me in complete reduction and analysis of data from a large experimental program conducted at Pennsylvania State University.

Dr. Christian left us with an operational generator of trumble coherent light in the infrared. An invaluable tool, not available commercially.

Don's work gets us off to a good start with our new UV camera.

We had not used two modules in our computer cloud model - Pat used them and evaluated their performance.

He gave us some new insights that we didn't have before his visit.

We are preparing two papers for publication in journal.

We have specific tasks to understand variations in the solar atmosphere as a function of the solar cycle. The line asymmetries measured by the associate form an important data point for this project.

For example, fresh perspective on computational grids contributes to alleviate artificial boundary problems in computational meteorology.

Of value in future balloon borne lidar research.

He performed work that an in-house person would otherwise have had to undertake.

A new contractual work unit will be expediated by about two months plus.

His work has potential in control system design for supermaneuverable aircraft and hypervelocity aircraft.

His literature search in area of compressible turbulent boundary layer separation on rough surfaces will help in the selection of tasks in this area of research.

He familiarized us with the need for planning a program so that the data acquired can be effectively analyzed using statistical methods.

Providing more confidence in the adequacy of our chemical models.

We are able to expand our research areas. With our manpower limitations we could not do without this program.

FIB has a basic research task in dynamics and control of large space structures and Dr. Becus's work fitted with our plan.

Thermal-mechanical coupling is expected to play important role in Air Force projects Dr. Young's work is a good starting point for continued research.

Dr. Eastep's work in structure-control synthesis contributed to the goals of basic research in this area.

The simplification of large systems is an integral part of the control design.

Conducted a preliminary research in the area of unsteady flow control.

Dr. Murty began an exploratory research topic which our organization currently does not have the manpower to handle.

By illustrating an alternate approach to incorporate flying qualities requirements into preliminary design.

His research study was directly relevant to an area of major concern in our overall program. His results were clear and understandable and reasonably definitive.

He investigated an area of individual difference that may be of importance to the Air Force, but one which had not been addressed in our lab.

His work improved a pilot selection test.

By providing a better understanding of processes that could be occurring in combustors.

He initiated improvement in our Monte Carlo calculations.

Increased Lab's information on high temperature tube properties.

Dr. Ho's efforts on composite aluminum and high strength conductors has started an in-house effort at APL with great potential.

On 6.1 research program has been greatly enhanced.

Quantitative roughness of turbine blades.

Helped validate use of ATB Model for natural human motion.

His work in applied statistics provides a significant variation on the analysis of data from paired comparison designs.

Implemented mechanical head/neck dynamic response testing program.

He developed a close loop control system that improves the response of the G-suit valve.

Extensive analysis of expert system - but not really research.

Collected data on non-verbal behavior in group problem solving. Reviewed and recommended designs for teleconferencing research Lab in command and control.

Excellent study, part of results mentioned at recent conference.

7. Would you classify the summer effort under the SFRP as research?
YES - 131
NO - 4

Comment:

Research papers will result from the work due.

Numerous research studies were performed.

Several research projects were completed and one will be published.

Researched analytical techniques available to resolve USAF-contractor dispute.

Automated calibration of tracking radar system techniques required effective research.

Study.

Without question.

The approach taken by Dr. Hadlock was very original.

Some very fundamental concepts and ideas were examined and put to use.

Exploratory of Basic.

USAFSAM computer resources have become outmoded.

Project to which he was assigned is state-of-the-art in artificial intelligence.

New concept of AI were combined with simulation application.

Work of this type has never been done before. It expands the state of the art.

Work was in direct support of our in-house OSR task.

His work was more of a review of the state-of-the-art and did not involve new research.

New analytical methods are being developed.

Truth maintenance and learning are basic research issues in the AI business.

Animal research.

He tried some procedures that didn't work before he produced a successful approach, and the work can be expanded.

Very much an experimental research project.

Bridged gap between experimental and analytical areas.

Quite involved analysis, new electromagnetics problems.

Clinical research with possible operational application.

The program developed has two directions; one is more applied research, while the other is more basic research.

Searched for better ways to run blood leads.

His work is fundamental to basic research.

The anti-cardiolipin assay and the LAK assay will be principally used for research.

Most of the actual research for this effort was done in the library.

Research is on cutting edge of new polymer development.

He has continued his personal research on the shear lag model and done extensive reviews and assessment of literature on micromechanical failure modes.

AI based process control using multiple expert systems.

A very useful short term research program with high pay off.

We expect one or two papers in leading research journals.

Dr. Tomiyama examined in detail the basic assumptions of the existing computer model, then developed analytic expressions to represent them.

The ideas Prof. Kung is coming up with and implementing has not been done.

Research with development to practical application.

The effort was directed at understanding "state of the art" in atmospheric optical effects.

A set of original data, yet to be fully analyzed was obtained.

But only in part, because of scheduling problems (ours) he was unable to carry on things both he and we wish had been possible.

Basic research on slope flows.

He got a new research topic started.

The project was basic research into the solar gravitational red shift and changes in solar rotation that should provide understanding of how solar convection and rotation vary with time.

Free investigation by Associate.

Applied research.

Basic research. Much needs to be done before considered for implementation on real systems.

Performing a thorough literature search and synopsizing the results is an important step in performing research.

It was the prelminary phase to real research.

This ten week program is an excellent stepping stone for formulation of future research plans.

It is an excellent starting point for expansion of research in the area to address Air Force problems in space.

It constitutes the necessary preliminary work on the research.

It gives an opportunity to the faculty to formulate problems for future research.

He conducted from experiments with Air Force recruits.

Research of the highest quality.

He had three problems of direct Air Force relevant research.

Definitely. Original effort in tubes degradation properties.

Limited some of effort for completion in 10 weeks.

It was an extension to a technique for analyzing the results of research experiments.

Developed testing procedures for research program.

It was a successful research effort.

8. Was a Graduate Student assigned to your group this summer?
   YES - 54
   NO - 81

   If so, did this enhance the research productivity?
   YES - 43
   NO - 3

   Was it an administrative burden?
   YES - 3
   NO - 43

9. Were your relations with the Associate satisfactory from a technical point of view?
   YES - 133
   NO - 2

   Suggestions as to how they might be improved:

   Sometimes his level of expertise exceeded my comprehension. An information exchange either by phone or in person prior to the start of the SFRP would be beneficial to both parties.

   More time in program.

   Look forward to continuing that relationship.

   Wish I would have had more time.

   Need closer coordination between associate and this laboratory prior to his arrival.

   Greater lead time needed as to who will be selected and assigned.

   A security clearance prior to arrival would have been an asset. A pre-reporting visit of longer duration than one day would have been beneficial in selection of a research topic and work area.

   Couldn't be improved.

   We had weekly, lengthy productive conferences (he worked off-site in San Antonio).

Provide the Associate suggested areas of study, along with document references, prior to his work term.

Technical relations with Dr. Day were splendid.

No improvement needed. He was very communicative.

No improvement is necessary. We had a very close professional arrangement and discussed aspects of the project very freely.

Need to follow-up with mini-grant! Planned to continue 6.1 funding in 87 but he needs more!

Accomplish priorities as we set them. As it was, the top priority task was not finished although substantial progress was made on second priority.

Dr. Patel was a superb technician. We perhaps could have better taken advantage of his capabilities if we had known more about what his capabilities were.

Never assign a summer faculty member to someone without prior notice.

A longer stay would have helped.

Better background in AI.

Let him stay all year!

They were superb.

Time is the essential limitation. If we could expand the length of the program - 10 week in the lab and additional time at the faculty member's institution - it would be more effective.

Frequent technical exchanges bring scientific issue into sharp focus.

Both were excellent participants, well qualified, motivated and able to work with little supervision.

I don't believe our relations with Jorge Mendoza could have been better than they were.

Very good relationship. Could not be improved upon.

My personal time was largely spent in starting numerous contracts this summer and has not been beneficial in sharing experience with Dr. Ho.

10. Do you think that by having a Faculty Associate assigned to your group, others in the group benefited and/or were stimulated by his presence?
YES - 126
NO - 9

Comments:

Dave was particularly helpful in instructing one of the undergraduates in the lab. Some of his work has stimulated a new research topic.

Some of Dave's work has resulted in beginning new research projects in the area in which he was working.

The work done was in collaboration with other researchers here, increasing everyone's total productivity.

Interesting, especially for my young lieutenants.

He helped mentor and newer people in the project area.

Not only did they learn a lot, but now everyone wants a "slice" of this technical area.

Other engineers were encouraged to take graduate courses. Technical discussions were stimulated.

Good interaction with other members of office.

Dr. Morton gave several lectures to staff educating them about model and theories supporting it.

Associate performed research involving other investigations. They were impressed with the accomplishments.

They enjoyed the exchange of information.

Because the project they were working on was too far removed from the "real world" of our daily business.

Project was not related to any current effort.

Absolutely. Dr. Hung provided a tutorial presentation on statistical methods for the entire office. He also gave a briefing which summarized his research.

Professor Jones presented a series of technical seminars that were well received and attended by AD scientists and engineers.

To a limited degree, one other person besides myself had regular technical discussions.

His previous background on EGG data collection has stimulated other doctors in the group.

Very stimulating technical discussions took place and the associate presented two briefings on his work to the Branch.

All people involved were stimulated by the enthusiasm/expertise shown by the associate.

Benefit is primarily to our in-house computational fluid dynamics research team.

Difficult to say; he worked alone.

Project staff requests summer professors for forseeable future.

Grant to continue work in the same specialized area.

Technical discussions generated by the presence of our Associate as well as others were extremely beneficial to our program here.

Very little, Dr. Moorthy tended to stay to himself and did not interact with the group very much.

Dr. Boggs interacted with all of the branch members.

Dr. Loy interacted with most branch members.

Several members became quite involved and broader areas were considered.

Dr. Sivazlian conversed with most of the group for inputs to his work.

I think many in our group benefited from the informal discussions with Dr. Day. He also gave two well attended seminars which stimulates some lively technical discussions.

Dr. Whidden was always willing to sit down and discuss his prior research work with members of the division staff.

Some more than others.

Dr. Moyer had ample biological discussions with members.

Dr. Wooten in particular has expertise in many areas of visual science and was of benefit to the laboratory in general.

Fabian is a dynamic person who can incite active research.

Provided new point of view to stimulated greater interactions and new though processes.

Provided interactions and fresh point of view not normally existent - stimulated new thoughts.

He is a fine example of a dedicated researcher. People respected this.

The new or different approach to similar studies stimulated our staff.

We all learned a little micro.

Provided very positive interaction.

Breath of fresh air - very valuable program! Important to continue!

Interest in work by outside lab.

One problem is that our technician staff was insufficient to support the associate.

The stimulus of Dr. Patel's presence has led to further staff involvement in research projects utilizing the assays which he developed.

There was good communication facilitated by weekly group meetings.

Dr. Jones' research interests are not related to most of the research currently underway in VNC. Her emphasis has been ultrastructural studies of schistosomes, and we do not deal in parasitology or EM work.

It's very essential to have influx of new people.

Use of infrared spectroscopy enhanced research efforts on-going.

University researchers bring different concepts to the research effort. In this case, our planned research activity has been expanded considerably with the help of the associate.

He was willing to share his knowledge with group members in fields such as linear programming and network theory.

Having someone with fresh ideas and daily contact with others in the group were quite stimulating and beneficial.

It gives us access to people and projects that we would not have otherwise.

Who can tell?

Dr. Stock interacted easily and at his suggestion, he gave a seminar series of three lectures on x-ray topography which were very useful.

Dr. Paige's excellent approach and technical skills provided both an excellent example as well as "training/education" to others in the group.

Dr. Greene was of great assistance to several people in my group.

There was indirect benefit to the group, however, the Associate and I worked very closely and intensely together.

Dr. Tomiyama provided a fresh, analytic look at several of our key problem areas.

Did not work with any other people in the group, however did brief his work to the directorate.

Dr. Truman was able to discuss various experiments in progress and make suggestions.

He was very open and always willing to share his ideas with everyone.

A source of new concepts, Dr. Gupta helped on other projects to which he wasn't specifically assigned.

Everybody who was in daily contact with Dr. Ahlquist shared with and learned from his knowledge through technical and scientific discussions.

There was some very good discussions. Yes, it has been my experience, generally, that faculty associates stimulate the group they are assigned to.

He had useful comments and contributions to several scientific projects.

We had a new Captain who learned about our computer system and numerical model by interacting with Pat.

It is important to have some new and different points of view expressed, and others also profitted from the experience.

Several members of the solar research branch worked with Dr. LoPresto and established collaborative programs.

A qualified yes possibly due to physical separation of offices. Apparently strong interaction existed among Associates due to closeness in living quarters.

Of value to several persons in lidar group.

Little opportunity - others extremely busy with field work.

There was limited interaction between the faculty associate and other members of our group. Most of our group are not involved in basic research.

Personnel in other groups were also exposed to statistical analysis capabilties and were sensitized to the need for planning the data to be gathered so that statistical analysis can be effectively performed.

Not in this case. Dr. Yip's efforts were not in the area most of us is involved in.

Definitely this is a positive contribution because young engineers can discuss problems with the experienced faculty.

It is an excellent opportunity for young engineers to grow into research.

Other members of the group were able to interact with the researcher and to get his opinion on a variety of technical issues.

Bring a new perspective of basic understanding.

Dr. Murty interacted with several members of our group. All comments concerning Dr. Murty were positive and enthusiastic.

Both sides benefitted from many technical discussions.

His approach was novel and creative and systematic; he interacted freely with us about what he was doing. I believe that this was "motivating" for the staff.

There were many formal and informal exchanges of ideas and information.

The junior military benefited greatly from Dr. Ho's laboratory experience and can do attitude.

Scientific exchange is always stimulating. Different viewpoints can but increase our growth.

A new set of insights is always beneficial.

Helped train branch personnel on research approach.

Dr. Rattan increased our understanding of new state-of-the-art technology advances in control theory.

Dr. Wellens is a source of a dazzling number of good research ideas. Picked up instantaneously on the interplay of seeming diverse research programs and facilities.

His knowledge and enthusiasm were helpful.

11. Do you feel that introduction to each other, together with the summer work experience and performance could form a sound basis for continuation of effort by Associate at his home institute?
YES - 124
NO - 11

If yes, how?

We are continuing to collaborate and should produce three research papers this year.

We are continuing to collaborate and should be able to produce two research papers over thte next year.

We are continuing to collaborate. Two joint research papers should result over the course of the next year.

The problem being worked is general enough to be investigated by graduate students or by Dr. Kolitz at his work station. The computer programming and access is easily achieved.

Follow up R&D in same related areas.

This would be terrific and possible.

By advancing to the more realistic problem.

Dr. Quimby has a new area within which to educate his students. I will do everything possible to maintain professional contact with him. The summer's work has opened a new area very worth of further work (and funding!).

Participate in analysis of experimental results.

Demonstrated capability to accomplish the work.

The effort started on the summer program does not require special hardware to be continued.

Doyle knows the type work we do and can better advise his students and plan the courses.

The work he did here laid the ground work for many follow-on projects.

Additional work is needed to improve model. Dr. Morton now understands it and "rate of return" for other efforts is greatly increased. Otherwise, new person would need to duplicate her start-up.

Many expressed an interest to meet each other and exchange information.

If by "each other" you mean the other associate the answer is yes since they were working together before. If you mean the BRMC staff the answer is "no" - their research is too theoretical.

He was introduced to several additional problems we are interested in.

A continuation of his research through the AFOSR is anticipated; and his association with a nearby university will permit an avenue of further use as a consultant or part-time employee.

Possibly.

Dr. Claiborne and myself have already finalized an outline for the work we would like to perform as a follow-up of the work accomplished this summer.

Dr. Hadlock's work is close to a breakthrough; further effort would be beneficial both to him and the Air Force.

Through continued analytical research and consultation.

The work begun here can very easily be continued at his home campus.

Associate could be used as consultant or contractor for small efforts.

Direct related graduate student activities as well as his own research.

We are planning a continuation/will request mini-grant.

Introduction to the problem could stimulate interest in pursuing grants.

While Dr. Boggs was here, discussions were held about future research projects.

Through our post-doctoral program.

Especially if he gets mini-grant.

We intend to pursue avenues for funding his continued work on the subject.

Highly recommend a AFOSR mini-grant. Also Dr. Day was invited to submit a white paper to us.

Dr. Whidden plans on continuing his work on burn shock and hyperbaric oxygen.

Associate expressed interest and has most facilities.

Dr. Moyer could continue the development of the cell line.

Dr. Wooten will apply for the UES/RIP award to continue collaboration in the area of color contrast.

Through mutual research proposals and future summer students.

Provided basis for new research.

I certainly hope he gets a mini-grant, we want to work with him.

Provide additional financial support for the next phase.

The work is not completed and needs more research before becoming an accepted laboratory procedure. The additional research could be done at the associate's home institute with other funding.

Through a mini-grant continuation.

Performance of part of the research at USAFSAM.

By the further development of software interfaces.

Study Li-LiH mixtures and properties.

Continue packed bed heat transfer.

The techniques learned by Dr. Patel will be useful to him in his home institution and we expect to further collaborate on projects pertinent to his visit with us.

Associate intends to spend academice year 1987-8 here.

Dr. Jones intends to submit a research proposal based on her work in the library this summer. Beyond that, I doubt that there will be much research interaction.

Interaction with him and his students (as future recruits).

Within limits of institution and time of associate, research could be continued on some phases of research at home institution.

He has been introduced to our thinking and approach in a developing research area. He has had first hand observation of our analytical and experimental activities.

The application and extension of the research addressed this summer.

The summer program allows the associates to think of the research problems which are of major concern to DOD and Air Force. Hopefully the associates devote additional time and effort for improvement or refinement of the materials/processing and the like of interest of AF.

Anticipated mini-grant.

Continuation of sample examination by Raman spectroscopy.

He will continue to work for me if we provide money.

We plan to send him samples and coordinate research.

Provided the equipment and computer support are made available the associate does not have the necessary equipment at his university at the current time.

If he is interested in further work we could identify the areas of our interest.

Dr. Greene's experience with research this summer will allow him to continue this work.

New research problems have been identified during his effotts at AAAT.

This was our first direct introduction to the application of a Systems Science approach to some of our computer models. The technique works, and Penn State has expressed interest in continuing research in this area with applications to Avionics Laboratory problems.

By continuing his modeling of the transistor.

Through application of our methodology in their research envircnment.

Mini-grant and post doc. efforts.

Further development of the turbulence models should be continued.

He plans to continue the research in greater detail and is looking at possibly coming back next year for a sabbatical from the University.

Improved mutual understanding of Air Force science needs.

By continuing and extending to research initiated by the program.

The summer relationship has been extremely good and much has been accomplished. There is a great deal of modeling on C_n^2, the atmospheric structure parameter, left to be done. Since Prof. Battles is quite familiar with the problems, he is well suited to work on these problems at his home institute.

Dr. Christian now has the resources to continue his investigation into VR coherent light sources.

Don understands both the instrumentation and our long term goals with it. There are studies we see need for but are unlikely to accomplish in-house.

Pat is already discussing the mini-grant program with his institution.

Through a follow-on mini-grant or possibly a contract from AFGL.

He will do calculations based on experimental work at AFGL.

The Associate will use data collected at Sac Peak and data I will give him to continue studying solar rotational changes.

The Associate should build on results of the summer research and focus on concrete, identifiable problems which are logical extension of the summer research.

Through knowledge of a new area of research using his skills.

In general yes. The current problem has been solved.

Groundwork laid for making progress efficiently.

By establishing a joint effort in which the AFWAL wind tunnels are used to study fluid mechanics phenomena with data analysis and theoretical development being performed at the home office.

Analysis of in-service durability data for F-111 and F-16 transparencies would be one of several worthwhile candidates for such work.

Dr. Yip has expressed a desire to continue to look at the sensitivity of the chemical model.

In almost all cases the faculty continues work in the area by assigned these topics to graduate students and increasing their own effort.

The faculty brings to the attention of graduate students the current problems of interest to Air Force.

The faculty continues work in the area - brings graduate student and interests them in the area.

This is the best way to bring complex aerospace problems to the attention of University Faculty and Graduate Students.

The researcher uncovered several new problems during the course of his summer visit.

The research topic chosen has the potential for a great deal of follow-on work.

He is submitting a mini-grant and is much better qualified to study flying qualities.

He is continuing to analyze data collected and may propose future collaboration studies with AFHRL/AFOSR Grant Program.

He can continue his research having formed the foundation during his stay.

Through Air Force contacts.

It was demonstrated to him how collisional physics relates to practical problems.

Through the second phase funding and sponsored research efforts.

Develop methods for collection of spatial kinematic data for AAMRL model applications.

Possibilities for joint research were discussed.

Interests are highly related, but some continued work at our Lab facility would be highly desireable by associate.

At Wright State University, Dr. Rattan has organized some professors together to further research this effort.

Issues of social distance in distributed problem solving could ideally be researched at Dr. Wellens' campus.

I hope we can continue our collaboration.

If no, why not?

This topic is very domain specific.

The work he did was too generalized - continuation of such work can be accomplished in relevant specific areas more readily via computer program usage.

Dr. Moorthy's project did not produce a product that has significant potential for future work in the area.

He plans to move to a different university. His plans are unclear at this time.

The biggest limitation would be his lack of access to a population of people with piloting experience.

The project was short term. The results obtained do not suggest that further efforts are warranted.

Prof. Doria has too heavy a teaching load for him to continue his research.

Evidently, Cedarville College does not have an administrative mechanism that would permit continuation of the work at Dr. Flentge's lab.

Dr. Tacker's familiarization with AI is still somewhat cursory - not adequate to perform research.

12. One of the objectives of this program is to identify sources of basic research capability and availability to the USAF. On a scale of A to D, how effective do you think this program will be in that respect? (high) A B C D (low)

A 79 B 48 C 6 D 2

13. Also, please evaluate: A (high........D (low)

Opportunity to stimulate group activity	A	76	B	47	C	8	D	3
Professional association	A	94	B	34	C	6	D	
Program administration	A	61	B	56	C	14	D	3

B. ADMINISTRATIVE ASPECTS

1. When did you first hear of this program?

1984.

HRL status quo.

Several years ago.

Past years of associate involvement.

HRL status quo.

Have heard it mentioned in lab on and off for several years.

15 May 1986.

1982.

1986.

Summer 1985.

When I first came to the LMC.

Six years ago.

10-15 years ago.

10 years ago.

When assigned to BRMC - September 1984.

Winter 1982.

1981.

Early 1970's.

I have managed this program for several years.

Spring 1986.

Approximately 10 years ago.

1984.

When I was assigned to the Associate.

Receipt of resumes.

Two years ago.

February 1986.

Its first year of existance (about 1975).

During indoctrination.

1983.

Right before Dr. McDonald arrived.

At its conception.

Early in 1986 when informed of program by Dr. Lou Slouse of Brooks AFB.

Conveniennt. From a co-worker who had seen a circulating list of the applicants and their areas of interest.

Two years ago.

2. Were you involved in the screening and prioritizing of the faculty applicants for your lab?
   YES - 82
   NO - 53

   If yes, do you have any suggestions for improvement of the procedures used?

   More information could be distributed on the work done at the lab to potential candidates.

   There needs to be better correlation between discipline terminology and actual discipline performance, e.g. does Artificial Intelligence experience relate to Human Behavior or to Weapon allocation. The use and techniques are quite different.

   Before a graduate student is accepted by UES, we need to discuss that student's potential assistance with the professor before a student is nominated by the professor otherwise, students are appointed who should not be part of the program.

   Did have an opportunity to make a "case" for Dr. Quimby with the lab director.

   Start selection process earlier.

   Provide the university system with information on the program.

   Resumes should be complete.

   At present, the program is being run locally by a single individual who affords no opportunity whatsoever to screen or prioritize applicants. My efforts to recruit applicants was entirely done in an independent manner with no formal request. Host investigators should be included in some fashion in the selection process.

   Would prefer a larger selection (better advertising?).

   AMD labs try not to compete with each other; occasionally awkward.

   Works pretty well; the AMD laboratories try to be careful not to compete with other.

   Better local coordination - earlier division planning of coordinator.

   More lead time.

   Give us more time for applicant review.

   Dr. Jones was not among the people whose records were submitted for our review. She was assigned to me in the first week of July with no warning to either of us. I recommend that in the future, only approved and accepted applicants be assigned to positions.

Need to get information back to screeners as to status much sooner.

I think you do the best you can without burdening me.

Try to have all applications arrive together - this simplifies prioritization.

Less paperwork - fewer questionnaires.

The in-laboratory 'sorting process' can be very restrictive. If we had relied on it alone we would not have had an Associate this summer.

The Associate did not make a pre-trip to the site.

It is reasonable as it is last year there was too much involvement from lab management which resulted in some confusion - of course it was partly because of expansion.

I believe it is a good procedure as it is.

(Involved at Division level) Get information to Branch/Group level early enough so candidates can be encouraged to apply.

Greater publicity is needed to ensure more qualified applicants.

The procedures are satisfactory.

No, it seems to work well.

Need to see applications earlier and in one package-prioritization difficult otherwise.

3. How do do you rate the importance of the expense-paid pre-program visit to the work site?

Essential	- 102
Convenient	- 27
Not worth expense	- 6

Please add any comments:

The summer visit allowed us to set up research objectives, give the participant background information, and insure that all supplies would be ready on his arrival. The visit let the participant begin research immediately, saving a good three weeks.

Dr. Hoffman was able to hit the ground running. His pre-visit allowed him to do some reading, thinking before arriving to work.

This could clarify the job requirements and also the skill application. It would result in mutual acceptance (or not) and prevent disconnects once the effort starts.

Only way to get a running start on a short program.

Enables background work to be accomplished prior to the on-site work.

Time is well spent, especially in locating housing for summer tour.

It's an intensive 10 week effort - and 10 weeks goes fast. They need to hit the ground running and should not have the hassles of finding a place, etc.

Gave Dr. Morton a head start.

Helps associate to prepare for research.

To meet and discuss tasks of mutual interest is essential to planning and provides the professor an opportunity to arrange for housing.

How else can the details of the project be worked out to the point that necessary supplies can be identified and ordered in time.

Provides head start needed for a 10 week program.

Should not wait until he is on-site to plan problem details.

Housing/transportation/area familiarization.

I consider this essential in order to orient the Associate and to make clear what the problem and objectives are.

It gives the laboratory and the scientist an early opportunity to determine what meaningful research can be done. Since the summer work is so short (10 weeks) this is very important.

Without it I don't think I would have participated.

Convenient to the 2nd summer, Essential to the first.

I was not aware of this pre-program visit. Such a visit would enhance an early understanding of the research area and the needs for the ten week program.

Probably allows the investigator to do some homework to better prepare for the assignment.

The investigator would be better served if he had formed a better idea of the equipment we had available prior to arrival.

Let the associate come to his summer sessions 2-3 days early and reimburse him.

10 weeks is a very short time - a pre-visit helps to overcome this problem.

Stimulates thinking and reduces start-up time. Gets administrative matters (housing, etc.) out of way.

This was the time when the proposal was developed, discussed, and hammered out.

I was able to present the background of the project to Dr. Houk. It allowed him to do some background reading into the subject before arriving.

It gives the professor a chance to do preliminary literature research.

Gave us a head start on ordering, literature review, etc.

Much time would be lost on details on first arrival of associate.

Did not make a big difference in this case since we were already in contact with him. Don't drop the idea!

Laboratory tour necessary to allow associate to plan.

Faculty needs time to investigate facilities, plan experiments.

On the pre-program visit it is important to identify the potential capabilities of the Faculty Associate and to clarify expectations of his visit with us.

Some form of interaction is necessary. A pre-site visit would be helpful, but a phone call might do as well. This is probably more important for new members than for returning facility.

Vital for coordinating program and for associate to make plans for housing, etc.

The associate has the opportunity to get familiar with the work place and to discuss the work plan for the summer.

In this case, since Dr. Schneider is at University of Dayton it was not used.

For an out-of-town person with a technique new to us, the visit paid big dividends in allowing preparations to be made that increased productivity.

It permitted the associate to both understand the area he was going to conduct research in as well as permit the necessary preparation for the agreed upon research approach, etc., to be completed prior to his assignment.

Problem definition are necessary to maximize a 10 week effort.

We really can't do without that visit.

Prof. Zobrist was well prepared and ready to start with his project the very first day.

Prof. Truman was already located in New Mexico.

It gives the Associate a much better picture of our program which allows him to better select and define his research topic before arriving for the summer. Thus, when he shows up, he is much more ready to begin work.

The program is an efficient and effective way of improving and promoting communications and enhancing research activities at both ends.

Convenient. It is beneficial in setting up an outline of the research effort prior to the start of the program.

In order to prepare properly for an experimental project I will always need to discuss many topics with the associate prior to project.

In this case, we formed a basis for defining a project of mutual interest.

Mutual exploration before the program starts enables both the faculty and the institution to prepare for the program.

Since the program is only 10 weeks long, outlining the details of the effort prior to the start of the program is essential to a successful completion of the task. A pre-program visit ensures that this is accomplished.

Visit was essential in providing Dr. Lee with initial information on aircraft transparency issues, to include documents for him to review before the start of the effort itself.

"Essential" may be too strong - "convenient" is too weak. We need a chance to orient the researcher before he comes.

At least in majority of the cases the visit provides good opportunity for formulation of research problem and some understanding of our facilities.

This visit provides opportunity in research problem and understanding our facilities.

Good opportunity for advance preparation in view of short duration of stay.

It permits the Associate an excellent opportunity to see the lab and to make arrangements for housing.

Project and orientation is critical to the success of this program.

Actually, between convenient and essential. Some sort of contact is essential before the summer period begins.

It allowed associate to design and program experiment before coming to the Lab.

Prepares the scientist for a productive summer.

Essential, the visit enables us to determine the candidates potential for research effort.

Most important feature. Without it, the shortness of the program (10 weeks) prevents any significant work.

In this case allowed us to prepare a productive experiment in which Dr. Wellens participated. Allowed us lead time so that Dr. Wellens could complete facility recommendation in 10 week window.

10 weeks are short and pre planning is essential.

4. Considering the calendar "window" of ten weeks (limited by varying college and university schedules), please comment on the program length. Were you as a team able to accomplish
   - more than - 26
   - less than - 19
   - about what you expected - 40

Comments:

Ten weeks is an extremely short time, however, it provides a good indication of the work value. If the work is valuable, it may be continued through a grant and subsequent SFRP as in the case of Dr. Kolitz.

Only because of advance planning and pre-visits.

Complete program required experimental data which could not be obtained in time alloted. Better planning on our part would have prevented this.

Longer would be beneficial.

The 10 week schedule is short when considering basic design.

Care must be taken to select projects that can be completed in the short time the faculty member is available.

Mostly because Prof. Lyons worked nights/weekends to get the job done.

Window is adequate for the task.

Could be two weeks longer.

A longer period is desirable; however, the mini-grant program is an avenue for continuation of promising research.

Ten weeks is far too little to accomplish any major research, say enough for a full publication, but if one keeps in mind this limitation it is possible to complete many projects of narrower scope.

Because of pre-program visit mutal derived schedule allowed realistic accomplishments.

Tight schedule for the size of his task, particularly when scope was expanded at end of 6th week.

Prof. Schori brought new skills to the project team.

Dr. Keener's lack of experience in control theory reduced this "window" to effectively 6 weeks. Four weeks were spent reviewing.

The first term was mostly a learning experience. A second term would be much more productive.

It is easy to plan more than can be accomplished. Writing the final report takes one to one and a half weeks away from the total time.

Prof. Zmuda was remarkably diligent in bypassing our bureauracracy.

More could be accomplished with prior planning on the part of the faculty associate.

More lead time planning could help.

The summer schedule should allow flexibility, i.e. 8-13 weeks.

We encountered difficulties with a laser system, which required repairs and severely limited our efforts.

Equipment problems hampered the efforts.

Two additional weeks would have proved beneficial.

He accomplished a great deal by working nights and weekends. He did quite a spectacular job. I think the program should be lengthened.

If both groups are brand new and unfamiliar with each other, the time is insufficient. In this instance, the groups were complementary and brand new.

I would like to see a little more time; however, I realize the limitations.

Due to the short time frame it is impossible to accomplish a great deal.

Ten weeks is certainly too short for basic research. About right to look at a particular applied research problem.

Outstanding accomplishments.

Again, we need to have extra technician support next time.

Faculty member was here only 8 weeks because of late start. Because there was no great amount of laboratory work ongoing, this was acceptable. At least 10 weeks would be needed if there were several projects in action.

It takes time to develop momentum.

Since we had an urgent need of thermo dynamics calculation of refractory ceramic-ceramic composites we were able to accomplish considerably more than it was expected.

It goes quickly, but the 10 week period give the faculty some flexibility in their schedule.

10 weeks is short, so associate must work hard and be rather bright to accomplish anything.

The early visit helped.

Dr. Paige's enthusiasm and diligence demonstrated by his taking work home with him enabled him to go much further into proposed mechanisms of reactions than had been anticipated.

Additional time would have been welcomed.

Completed a paper for presentation at COSPAR XXVI and completed and reported on Pennsylvania State University Program data and analysis which was extremely good for just 10 weeks.

10 weeks is short to perform research. Plenty of time to introduce AF research needs to new people.

We accomplished less than we set out to do in our original plans; ten weeks really wasn't enough and our (AFGL) schedule problems did not help.

The duration of the program is very short, and both parties must be careful not to tackle too large a problem.

One should tailor the program to suit the time available.

Ten weeks seems sufficient for this type of interaction.

More time would be very helpful. Perhaps if Associate could spend spring vacation here, to start the remaining summer weeks could used to better advantage.

The faculty associate has done the "extras" that are sometimes required to complete a project on time.

Had little knowledge of Dr. Lee's field (statistics), so had no solid basis from which to estimate what would be accomplished.

Addition of two more weeks may help in writing the report and preparing proposal.

This was because Jorge arrived with a plan for research already well laid-out and "hit the ground running."

Dr. Flengte's experience contributed greatly to the more than expected achievement of the effort.

Additional program length would be beneficial.

5. Would you desire another Faculty Associate to be assigned to you and/or your group/division?
   YES - 132
   NO - 3

   If no, why not?

   The work the Associate did for me was Projects Branch - type work- better suited in Projects Branch.

   Not for pure theoretical research.

6. Would you desire additional Graduate Students in this program?
   YES - 106
   NO - 15
   N/A - 14

7. Should the Graduate Students only be assigned to research <u>with</u> the Summer Research Faculty Member?
   YES - 50
   NO - 67
   N/A - 18

8. Should Graduate Students continue to be assigned <u>without</u> Summer Research Faculty supervision?
YES - 68
NO - 38
N/A - 29

9. Other Remarks.

We have employed Dr. Kolitz for the past two years and feel that our return on this investment has been worthwhile.

Shorten your questionnaire.

Overall a very positive collaboration. My only difficulties were logistical, i.e., trying to beg/borrow/steal the equipment necessary for the work. Other colleagues in the lab remarked "The program is a good idea, but I (we) don't take advantage of it because it's so hard to support these people". Suggestion - Modify the program such that the participant "comes with" a small pot of funds to purchase instruments/equipment. I would be happy to amplify on the above if someone cares to call.

Graduate students get an excellent chance at subsequent employment because of the extended contract.

It is a good program.

The failure to acquire a clearance for Mr. Brown prior to his arrival at AFWL severely restricted the projects I had planned for him to work on. His clearance did not show up until the last week of his assignment.

We have had several summer faculty members do work for our center, all have made significant contributions to our mission.

Excellent program. Would like procedure for follow-on work (mini-grants) improved; don't really know how/why grants are selected.

Prof. Lyons was one of the finest researchers and most productive researchers we've ever had.

Dr. Price made very significant contributions. He is very knowledgeable and a hard worker. I hope that he is awarded a continuation grant. The work has created a lot of interest and is very useful to the Air Force.

Dr. Chen is a very hard working individual as evidenced by his productivity during the summer (1 publication). His work is of great interest and should be continued.

In the future faculty associates assigned to the BRMC must work on projects directly related to our areas of interest as opposesd to projects they have been personally pursuing.

BRMC will desire future associates work on current problems that is a 10 week period some results can be shown.

The Summer Faculty Program is considered a superb program for the professors, the graduate students and for the Laboratories. We wish to continue our yearly involvement with the university system participants.

Each year I hear the same complaints "yesterday I heard they're going to assign an Associate to my lab and I have no idea of what he/she wants to do or what I would like them to accomplish while they're here." The investigators who ultimately end up working with these people are given precious little opportunity to play a role in the selection process.

Good program! Wish a larger number of associates would apply to insure a good choice for selections - maybe more advertising is needed.

We would certainly like to see Dr. Catalano return and continue research in the cavity flow area. This is a critical technology. To the USAF and continued AFOSR support over the next couple of years would be ideal.

I have problems with the schedule which selects professors and then selects graduate students; complicates the processing of pairing professors and graduate students.

This whole program is probably the most valuable activity for our basic research activities during the year, given the efficiency of the program, the little time involved on my part, and the results from the faculty members.

Graduate students are of more benefit to the Laboratory if they work under our direction rather than the direction of a summer professor.

This program is extremely beneficial to the analysis support group in AFATL. We are a small group with very little funding. This program can provide us the help we need to develop methods beyond our in-house capability.

Could improve matching of associates goals/expectations of the particular lab.

Find ways to encourage more U.S. citizens to apply.

I would be most interested in having Dr. Houk return to complete his work.

Keep up the good work - Universal Energy Systems and OSR.

Faculty may have alternate ideas to tasks assigned to graduate student. Therefore, faculty and graduate student need to meet together with government task mentor.

In general, Dr. Patel's visit with us was profitable in the development of assays that will continue to be used here in a research, and we hope, in a clinical setting. There needs to be improved communication to clarify proper administration, personal expectations, in the availability of laboratory staff at our institution to make the faculty associate's visit as profitable as it should be. These considerations could have been better coordinated as they applied to Dr. Patel's visit.

Note that I have no experience in graduate students in this program and my remarks should be interpreted in that light. I cannot over emphasize the need to coordinate the assigned of summer faculty with the research colleagues. I have to believe that Dr. Jones might have spent a more productive and interesting summer if she had the opportunity to work with someone in an area she was more familiar with. I also believe that it might have increased her chances of getting a follow-on research grant for next year, which was one of her primary aims.

A great program! Congratulations to you and your colleagues.

There seemed to be some confusion about the technical interests of the applicants which caused many of the applications to be sent to the wrong research groups here. This situation must be rectified in the future. Also the renumeration is very poor. This could have a severe impact on quality applicants. The 10 week period should be extended as much as possible - the longer the better.

Good program - we need it and more of it.

Additional funds should be provided to increase the number of associates interested in the program.

This is an excellent program that contributes to the scientific health of the Laboratory.

Would certainly welcome the opportunity to have Dr. Paige work with my group again.

The number of pages limited on their final report may restrict the quality of the report.

Many thanks to the staff at UES for their help in this process. They went out of their way and performed an individual sorting of applications for us to find an appropriate individual for our work. Dr. Tomiyama's resume came out of that effort and he proved to be just ideal!

I believe this program was very good and look forward in acquiring another program next summer.

An outstanding program which rejuvenates the in-house staff.

In regard to question 8, I believe there are graduate students who are mature enough not to need any faculty supervision.

I was extremely pleased with the amount and quality of the work completed under the summer program.

My first exposure to this program has been a positive one. I look forward to continuing it.

Overall a good program and I recommend that it continue into the future.

Since most observational programs are computer intensive for data processing they offer a good opportunity to introduce graduate students to the real world of data handling.

Consider the program of considerable value based on a first-time experience - would like to participate again.

Advanced, mature graduate students can be very effective and the experience also valluable to them when assigned directly to us.

I have two comments; 1) It appears that most of the graduate students in good schools are foreign nationals. It would be beneficial if faculty is allowed to bring their graduate students even though they are not U.S. citizens. Several summer faculty told me that they did not bring their students because the students are on F-1 visa. 2) In my opinion, Summer Faculty program is effective is we bring young faculty who recently finished their Ph.D. They are usually enthusiastic and ambitious to learn and work hard. Such young faculty are generally, non U.S. citizens and hold green cards. Currently, we have to do too much paper work to hire such faculty. I suggest the procedure be relaxed.

Since the Summer Faculty Research Program is concerned with basic research, I think the 6.1 Project Managers should be encouraged to include this program as an integral part of their program - as a source of research and as a source of replacement personnel.

We've been disappointed with the visitor a year ago. We really didn't know, if anything, that grant is accomplishing. I'd like to see future work by Dr. Yip fall in the same category.

The most usefulness of this program is awareness of the research needs of the Air Force by the university faculty and stimulating environment in the laboratory due to the presence and work of the young faculty. The by-product of this program is the improved quality of young engineers applying for positions in the laboratory.

Discussions and working with faculty who are very familiar with the theoretical aspects of the problems in formulating sound basis for research.

Bringing faculty into research laboratories is the best way to stimulate and sustain the spirit on which research thrives. New people and new ideas are particularly important because of severe hiring limitations in the government. The most recognizable by-product of this program is the improved quality of young engineers applying for positions in the lab.

It is good for the laboratory as well as the Air Force because it provides an opportunity for Air Force to bring complex problems to the attention of the most knowledgeable community.

The Faculty member was able to structure their activity such that they benefitted academically to a better extent than we could have because of unfamiliarity with their capabilities--Would have been very time consuming for a staff member.

As much information as possible on experience, hobbies, grades, personality, should be made available to the laboratory advisor before assignment.

The program is a success. We really need these people who can contribute to our program. Apparently at no cost to our laboratory.

This is an excellent program and should be continued.

Some graduate students may be acceptable but I would like to screen these student out, first.

Let me repeat, Dr. Wellens is a stand-out in this program. The best I've seen. Continued research involvement in our programs would be highly beneficial.

Excellent program. Very worthwhile for research project and continuing research.

APPENDIX II

APPENDIX II A

Summer Faculty Research Program

Sponsored by
Air Force Office of Scientific Research

Conducted by
Universal Energy Systems, Inc.

Program Statistics

Program Statistics

1. Applications Received (by Laboratory)

Organization		1st	2nd	3rd	Total
		Choice			
AAMRL	(WPAFB)	47	37	16	100
APL	(WPAFB)	25	29	13	67
AD	(Eglin)	26	20	17	63
AEDC	(Arnold)	13	7	5	25
AL	(WPAFB)	20	18	17	55
BRMC	(WPAFB)	9	8	0	17
ESMC	(Patrick)	7	7	5	19
ESD	(Hanscom)	10	11	7	28
ESC	(Tyndall)	51	25	28	104
FDL	(WPAFB)	36	20	12	68
FJSRL	(USAFA)	28	17	15	60
GL	(Hanscom)	28	11	7	46
HRL/LR	(WPAFB)	8	6	9	23
HRL/OT	(Williams)	11	10	8	31
HRL/MO	(Brooks)	16	15	13	44
HRL/ID	(Lowry)	14	12	4	30
LC	(WPAFB)	5	11	7	23
LMC	(Gunter)	11	13	9	33
ML	(WPAFB)	41	29	9	79
OEHL	(Brooks)	14	17	13	44
RPL	(Edwards)	17	15	25	57
RADC	(Griffiss)	53	27	16	96
SAM	(Brooks)	48	34	16	98
WHMC	(Brooks)	1	0	0	1
WL	(Kirtland)	44	46	19	108
	Totals	583	445	290	

2. Number of Participants - 158

Number with Bachelors Degree - 1
Number with Masters Degree - 10
Number with Doctorate Degree - 147

3. Academic Ranking

Assistant Professor - 69
Associate Professor - 48
Department Chairman - 3
Instructor - 3
Professor - 32
Researcher - 2
Senior Research Associate - 1

Program Statistics
Continued

4. Number of Participants at Each Laboratory

Organization

AAMRL	(WPAFB)	- 9	HRL/OT	(Williams	- 4
APL	(WPAFB)	- 8	HRL/LR	(WPAFB)	- 4
AD	(Eglin)	- 11	HRL/MO	(Brooks)	- 3
AEDC	(Arnold)	- 6	HRL/ID	(Lowry)	- 4
AL	(WPAFB)	- 7	LMC	(Gunter)	- 2
BRMC	(WPAFB)	- 2	ML	(WPAFB)	- 11
LC	(WPAFB)	- 1	OEHL	(Brooks)	- 4
ESMC	(Patrick)	- 0	RPL	(Edwards	- 5
ESD	(Hanscom	- 2	RADC	(Griffiss)	- 9
ESC	(Tyndall)	- 7	SAM	(Brooks)	- 17
FDL	(WPAFB)	- 13	WHMC	(Brooks)	- 1
FJSRL	(USAFA)	- 8	WL	(Kirtland)	- 7
GL	(Hanscom	- 13			
				Total	158

5. Discipline Represented - 51

Aero Engineering	- 4	Fluid Mechanics	- 1
Aerospace Engineering	- 1	History	- 1
Applied Mechanics	- 2	Hyperbaric Medicine	- 1
Analytical Chemistry	- 1	Industrial Engineering	- 1
Astronomy	- 1	Inorganic Chemistry	- 2
Atmospheric Science	- 1	Linguistics	- 1
Biochemical Genetics	- 1	Management Science	- 3
Biochemistry	- 1	Mathematics	- 13
Biology	- 2	Mechanical Engineering	- 15
Biomedical Engineering	- 1	Metallurgy	- 3
Biophysics	- 2	Meteorology	- 2
Chemistry	- 6	Microbiology	- 4
Civil Engineering	- 3	Motor Learning/Control	- 1
Computer Science	- 5	Operations Research	- 2
Education	- 2	Organic Chemistry	- 6
Educational Psychology	- 1	Pharmacology	- 1
Electrical Engineering	- 17	Physical Chemistry	- 6
Engineering	- 1	Physics	- 13
Engineering Admin.	- 1	Plasma Physics	- 1
Engineering Design	- 1	Psychology	- 6
Engineering Management	- 1	Quantitative Mgmt.	- 2
Engineering Mechanics	- 2	Solid State Physics	- 1
Engineering Physics	- 2	Statistics	- 4
Engineering Services	- 1	Systems Engineering	- 2
Exercise Physiology	- 1	Zoology	- 1
Experimental Psychology	- 4		

Program Statistics
Continued

6. Colleges and Universities Represented - Total 113

Adelphi University	- 1	Mass. Inst. of Tech.	- 1
Alabama A&M University	- 2	Meharry Medical College	- 1
Alabama, University of	- 5	Miami, University of	- 1
Alaska, University of	- 1	Miami, University of Ohio	- 1
Alfred University	- 2	Mississippi State University	- 1
Auburn University	- 1	Mississippi, University of	- 1
Boise State University	- 1	Missouri, University of	- 2
Bradley University	- 1	Montana State University	- 1
Brown University	- 1	Morehouse College	- 2
Carleton College	- 1	Motlow State College	- 1
Catholic Univ. of America	- 1	Nebraska, University of	- 1
Cedarvilie College	- 1	New Mexico, University of	- 1
Cincinnati, University of	- 4	New Orleans, University of	- 1
Citadel	- 2	Norfolk State University	- 1
Colorado, University of	- 3	North Carolina A&T St. Univ.	- 1
Dartmouth College	- 1	North Carolina, University	- 1
Davidson College	- 1	North Texas State University	- 1
Dayton, University of	- 6	Northern Arizona University	- 1
Drexel University	- 1	Northwestern University	- 1
Duke University	- 1	Oakwood College	- 1
Eastern Kentucky University	- 1	Ohio State University	- 3
Eastern Montana College	- 1	Ohio University	- 1
Edinboro University	- 1	Oklahoma State University	- 2
Florida Atlantic University	- 1	Oklahoma, University of	- 1
Florida International Univ.	- 1	Oregon State University	- 1
Florida State University	- 3	Pacific University	- 1
Florida, University of	- 3	Paine College	- 1
Franklin & Marshall College	- 1	Pennsylvania State Univ.	- 1
Georgia Inst. of Technology	- 1	Portland, University of	- 1
Georgia, University of	- 2	Purdue University	- 1
Grambling State University	- 1	Scranton, University of	- 1
Houghton College	- 1	South Carolina, Univ. of	- 1
Indiana University	- 1	Southern Illinois Univ.	- 1
Indiana Univ. of Pennsylvania	- 1	Southern Mississippi, Univ.	- 1
Iowa State University	- 1	Southern University	- 1
Iowa, University of	- 1	Stetson University	- 1
Jackson State University	- 4	Stevens Inst. of Technology	- 1
Jefferson State	- 1	Syracuse University	- 1
Kansas State University	- 1	Tennessee A&I University	- 1
Kennesaw University	- 1	Texas A&I University	- 1
Kent State University	- 1	Texas A&M University	- 2
Lehigh University.	- 1	Texas Southern University	- 2
Louisiana State University	- 5	Texas, University of	- 2
Lowell, University of	- 2	Toledo, University of	- 1
Lyndon State College	- 1	Tougaloo College	- 1
Maine, University of	- 1	Trinity University	- 1
Marquette University	- 1	Tulane, University of	- 1
Mary Washington College	- 1	Tulsa, University of	- 2
Massachusetts Maritime Acad.	- 1	United States Naval Academy	- 1
Massachusetts, University of	- 1	Valparaiso University	- 1

Continued

Program Statistics
Continued

6. Colleges and Universities Represented (Continued) Total 113

Vanderbilt University	- 1	Wichita State University	- 1
Warren Wilson College	- 1	Wisconsin - Eau Claire	- 1
Washington State University	- 2	Worchester Polytech. Inst.	- 1
Wayne State University	- 1	Wright State University	- 4
West Florida, University of	- 1	Wyoming, University of	- 1
West Georgia College	- 1	Xavier University	- 1
West Virginia University	- 1		

Total 158

Program Statistics
Continued

7. States Represented - 41

Alabama	- 10
Alaska	- 1
Arizona	- 1
Colorado	- 3
District of Columbia	- 1
Florida	- 11
Georgia	- 8
Idaho	- 1
Illinois	- 4
Indiana	- 2
Iowa	- 2
Kansas	- 2
Kentucky	- 1
Louisiana	- 10
Maine	- 1
Maryland	- 1
Massachusetts	- 6
Michigan	- 1
Mississippi	- 8
Missouri	- 2
Montana	- 2
Nebraska	- 1
New Hampshire	- 1
New Jersey	- 1
New Mexico	- 2
New York	- 5
North Carolina	- 5
Ohio	- 23
Oklahoma	- 5
Oregon	- 3
Pennsylvania	- 8
Rhode Island	- 1
South Carolina	- 3
Tennessee	- 5
Texas	- 9
Virginia	- 2
Vermont	- 1
Washington	- 2
West Virginia	- 1
Wisconsin	- 1
Wyoming	- 1

8. Age of Participants -

Average - 40.1

APPENDIX II B

LIST OF PARTICIPANTS

LIST OF PARTICIPANTS

NAME/ADDRESS	DEGREE, SPECIALTY, LABORATORY ASSIGNED
Dr. John E. Ahlquist Assistant Professor Dept. of Meteorology Florida State University Tallahassee, FL 32306-3034 (904) 644-1558.	Degree: Ph.D., Meteorology, 1981 Specialty: Meteorology Assigned: AFGL
Dr. Rasphal S. Ahluwalia Associate Professor Dept. of Industrial Eng. West Virginia University Morgantown, WV (304) 293-4607	Degree: Ph.D., Systems Eng., 1977 Specialty: Systems Engineering Assigned: AAMRL
Dr. David R. Anderson Assistant Professor Dept. of Chemistry University of Colorado Austin Bluffs Parkway Colorado Springs, CO 80907 (303) 570-9578	Degree: Ph.D., Organic Chemistry, 1978 Specialty: Organic Chemistry Assigned: FJSRL
Dr. David M. Barnhart Professor Dept. of Physical Sciences Eastern Montana College 1500 North 30th Street Billings, MT 59101-0298 (406) 657-2028	Degree: Ph.D., Chemistry, 1964 Specialty: Chemistry Assigned: FJSRL
Dr. Frank P. Battles Professor Mass. Maritime Academy Basic Science Dept. Buzzards Bay, MA 02532 (617) 224-8388	Degree: Ph.D., Physics, 1969 Specialty: Physics Assigned: AFGL
Dr. Georges A. Becus Associate Professor University of Cincinnati Aero. Engineering and Engineering Mechanics Cincinnati, OH 45221 (513) 475-6115	Degree: Ph.D., Engineering Science, 1973 Specialty: Engineering Services Assigned: FDL

Dr. Rex L. Berney Associate Professor University of Dayton Physics Department 300 College Park Dayton, OH 45469 (513) 299-3012 or 299-2311	Degree: Specialty: Assigned:	Ph.D., Solid State Physics, 1978 Solid State Physics AL
Dr. Albert W. Biggs Professor University of Alabama in Huntsville Electrical Engineering Engineering Bldg 263-B (ECE Dept.) Huntsville, AL 35899 (205) 895-6459	Degree: Specialty: Assigned:	Ph.D., Electrical Engineering, 1965 Electrical Engineering WL
Dr. Phillip A. Bishop Assistant Professor Director of Human Performance Laboratory The University of Alabama P O Box 1967 Area of HPER University, AL 35486 (205) 348-8370	Degree: Specialty: Assigned:	Ed.D., Exercise Physiology, 1983 Exercise Physiology SAM
Dr. Patricia T. Boggs Assistant Professor of Management Science Wright State University Dayton, OH 45435 (513) 873-2080 or 2290	Degree: Specialty: Assigned:	D.B.A., Decision Science, 1984 Decision Science HRL/LR
Dr. James A. Brown Assistant Professor Tougaloo College c/o History Dept. Tougaloo, MS 39174 (601) 957-3623	Degree: Specialty: Assigned:	M.A., History, 1966 History WL
Dr. Clifford G. Burgess Assistant Professor Univ. of Southern Mississippi Computer Science Department Sou. Station Box 5106 Hattiesburg, MS 39406 (601) 266-4949	Degree: Specialty: Assigned:	Ph.D., Computer Science, 1985 Computer Science SAM

Dr. Jeffrey D. Camm Assistant Professor University of Cincinnati Quantitative Analysis/IS ML #130 Cincinnati, OH 45221 (513) 475-3621	Degree: Specialty: Assigned:	Ph.D., Management Science, 1984 Management Science BRMC
Dr. Thomas A. Carney Assistant Professor Dept. of Meteorology Florida State University 404 Love Building Tallahassee, FL 32306 (904) 644-6806	Degree: Specialty: Assigned:	Ph.D., Meteorology, 1984 Meteorology ESC
Dr. George D. Catalano Associate Professor Mechanical Engineeering Dept. Louisiana State University Baton Rouge, LA 70803-6413 (504) 388-5792	Degree: Specialty: Assigned:	Ph.D., Aerospace Engineering, 1977 Aerospace Engineering AD
Dr. Bor-Chin Chang Assistant Professor Electrical Engineering Dept. Bradley University Peoria, IL 61625 (309) 676-7611	Degree: Specialty: Assigned:	Ph.D., Electrical Engineering, 1983 Electrical Engineering FDL
Dr. Garvin Chastain Associate Professor Boise State University Dept. of Psychology 1910 University Drive Boise, ID 83704 (208) 385-2855	Degree: Specialty: Assigned:	Ph.D., Human Experimental Psychology, 1976 Human Experimental Psychology HRL/OT
Dr. Shive K. Chaturvedi Assistant Professor Civil Engineering Ohio State University 470 Hitchcock Hall Columbus, OH 43210 (614) 422-2617	Degree: Specialty: Assigned:	Ph.D., Mechanical Engineering, 1979 Mechanical Engineering ML

Dr. Hoffman H. Chen
Associate Professor
Grambling State University
Department of Chemistry
Grambling, LA 71245
(318) 274-2260

Degree: Ph.D., Organic Chemistry, 1976
Specialty: Mechanical Engineering
Assigned: SAM

Dr. Lea D. Chen
Assistant Professor
The University of Iowa
Dept. of Mechanical Eng.
Iowa City, IA 52242
(319) 353-5695

Degree: Ph.D., Mechanical Engineering, 1981
Specialty: Organic Chemistry
Assigned: APL

Dr. Wu C. Cheng
Associate Professor
Physics Department
Paine College
1235 Fifteenth Street
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Degree: Ph.D., Physical Chemistry, 1954
Specialty: Physical Chemistry
Assigned: FJSRL

Dr. John Y. Cheung
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Degree: Ph.D., Electrical Engineering, 1975
Specialty: Electrical Engineering
Assigned: AL

Dr. Derald Chriss
Assistant Professor
Southern University
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Southern Branch P.O.
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(504) 771-2000

Degree: M.A., Chemistry, 1981
Specialty: Physical and Analytical Chemistry
Assigned: ML

Dr. Wolfgang Christian
Assistant Professor
Dept. of Physics
Davidson College
Davidson, NC 28036
(704) 892-2000

Degree: Ph.D., Physics, 1975
Specialty: Physics
Assigned: AFGL

Dr. Jacob N. Chung Associate Professor Washington State University Dept. of Mechanical Engineering Pullman, WA 99164-2920 (509) 335-3222	Degree: Ph.D., Mechanical Engineering, 1979 Specialty: Mechanical Engineering Assigned: APL
Dr. Brenda J. Claiborne Assistant Professor University of Texas, San Antonio Div. of Life Sciences San Antonio, TX 78285 (512) 691-4458	Degree: Ph.D., Biology, 1981 Specialty: Biology Assigned: SAM
Dr. Donald F. Collins Physics Chairman Warren Wilson College Physics Department Box 5117 701 Warren Wilson Road Swannanoa, NC 28778 (704) 298-3325	Degree: Ph.D., Physics, 1970 Specialty: Physics Assigned: AFGL
Dr. William T. Cooper Assistant Professor Chemistry Dept. Florida State University Tallahassee, FL 32306-3006 (904) 644-6875 or 644-3810	Degree: Ph.D., Chemistry, 1981 Specialty: Chemistry Assigned: ESC
Dr. Richard H. Cox Professor Kansas State University Center for Human Motor Performance 203 Ahearn Manhattan, KS 66502 (913) 532-6765	Degree: Ph.D., Motor Learning and Control, 1973 Specialty: Motor Learning & Control Assigned: HRL/MO
Dr. William Day Associate Professor Dept. of Computer Science and Engineering Auburn University 244 Payne Street Auburn, AL 36830 (205) 826-4330	Degree: Ph.D., Mathematics, 1969 Specialty: Mathematics Assigned: RADC

Dr. Vito G. DelVecchio Professor of Biology University of Scranton Scranton, PA 18510 (717) 961-6117	Degree: Specialty: Assigned:	Ph.D., Biochemical Genetics, 1967 Biochemistry, Genetics SAM
Dr. Shirshak K. Dhali Assistant Professor Dept. of Electrical Engineering Southern Illinois University Carbondale, IL 62901 (618) 536-2364	Degree: Specialty: Assigned:	Ph.D., Electrical Engineering, 1984 Electrical Engineering APL
Dr. Lokesh R. Dharani Assistant Professor University of Missouri-Rolla Dept. of Engineering Mechanics Rolla, MO 65401-0249 (314) 341-4586	Degree: Specialty: Assigned:	Ph.D., Engineering Mechanics, 1982 Engineering Mechanics ML
Dr. Peter J. Disimile Assistant Professor Aerospace Engineering and Engineering Mechanics University of Cincinnati Mail Location 70 Cincinnati, OH 45221 (513) 475-2936	Degree: Specialty: Assigned:	Ph.D., Fluid Mechanics, 1984 Fluid Mechanics FDL
Dr. Michael L. Doria Associate Professor of Mechanical Engineering Valparaiso University Valparaiso, IN 46383 (219) 464-5104	Degree: Specialty: Assigned:	Ph.D., Mechanics, 1968 Mechanics FDL
Dr. George R. Doyle, Jr. Associate Professor University of Dayton Mechanical Engineering Dept. 300 College Park Drive Dayton, OH 45469 (513) 229-2995	Degree: Specialty: Assigned:	Ph.D., Mechanical Engineering, 1973 Mechanical Engineering FDL

Dr. Franklin E. Eastep Professor Aerospace Engineering University of Dayton 300 College Park Drive Dayton, OH 45469 (513) 229-2241	Degree: Specialty: Assigned:	Ph.D., Aero and Astro, 1968 Aero and Astro FDL
Dr. Thaddeus J. Englert Assistant Professor University of Wyoming Dept. of Electrical Eng. University Station Laramie, WY 82071 (307) 766-6321	Degree: Specialty: Assigned:	Ph.D., Physics, 1982 Physics FJSRL
Dr. Dennis R. Flentge Assistant Professor Cedarville College Math/Science Department Box 601 Cedarville, OH 45314 (513) 766-2211	Degree: Specialty: Assigned:	Ph.D., Physical Chemistry, 1974 Physical Chemistry APL
Dr. Mark A. Fulk Assistant Professor University of Florida Computer & Information Sciences 512 Weil Hall Gainesville, FL 32611 (904) 392-9219	Degree: Specialty: Assigned:	Ph.D., Computer Science, 1986 Computer Science AD
Dr. Patrick T. Gannon, Sr. Assistant Professor Dept. of Meteorology Lyndon State College Vail Hill Lyndonville, VT 05851 (802) 626-9371	Degree: Specialty: Assigned:	Ph.D., Atmospheric Science, 1977 Atmospheric Science AFGL
Dr. John K. George Professor of Chemistry Mary Washington College Fredericksburg, VA 22401 (703) 899-4320	Degree: Specialty: Assigned:	Ph.D., Physical Chemistry, 1976 Physical Chemistry FJSRL

Dr. Albert C. Giere
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Degree: Ph.D., Mathematical Physics, 1965
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Assigned: AEDC

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Degree: Ph.D., Linguistics, 1979
Specialty: Linguistics
Assigned: HRL/ID

Dr. Thomas A. Gosink
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Degree: Ph.D., Organic Chemistry, 1965
Specialty: Organic Chemistry
Assigned: SAM

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Degree: A.B.D., Electrical Engineering, 1982
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Assigned: HRL/LR

Dr. Gerald R. Graves
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Industrial Engineering
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Degree: Ph.D, Industrial Engineering, 1985
Specialty: Industrial Engineering
Assigned: ML

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Degree: Ph.D., Physics, 1974
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Assigned: AL

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<u>Degree</u>: MSE Mechanical Engineering, 1978
<u>Specialty</u>: Mechanical Engineering
<u>Assigned</u>: RPL

Dr. William A. Grosky
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Wayne State University
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(313) 577-2477

<u>Degree</u>: Ph.D., Engineering and Applied Science, 1971
<u>Specialty</u>: Eng. & Applied Science
<u>Assigned</u>: AL

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Quantitative Business Analysis
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<u>Degree</u>: Ph.D., Engineering Management, 1981
<u>Specialty</u>: Engineering Management
<u>Assigned</u>: BRMC

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<u>Degree</u>: Ph.D., Mathematical Statistics, 1970
<u>Specialty</u>: Mathematical Statistics
<u>Assigned</u>: SAM

Dr. Fabian C. Hadipriono
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<u>Degree</u>: Ph.D., Engineering, Civil Engineering, 1982
<u>Specialty</u>: Engineering, Civil Engineering
<u>Assigned</u>: WL

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(305) 393-3342

<u>Degree</u>: Ph.D., Mathematics, 1966
<u>Specialty</u>: Mathematics
<u>Assigned</u>: SAM

Dr. Prabhat Hajela Assistant Professor Engineering Sciences University of Flordia 231 Aero Engineering Bldg. Gainesville, FL 32611 (904) 392-0961	Degree: Specialty: Assigned:	Ph.D., Aeronautics and Astronautics, 1982 Aeronautics & Astronautics AD
Dr. Patrick R. Hannon Assistant Professor Health & Physical Education Northern Arizona University Box 6012, HPR Dept. Flagstaff, AZ 86011 (602) 523-4122	Degree: Specialty: Assigned:	Ed.D., Exercise Science, 1980 Education, Exercise Science AAMRL
Dr. Donald F. Hanson Associate Professor University of Mississippi Dept. of Electrical Engineering University, MS 38677 (601) 232-5389	Degree: Specialty: Assigned:	Ph.D., Electrical Eng. (Electromagnetics), 1976 Electrical Engineering, Electromagnetic Electronics RADC
Dr. Gerald F. Harris Director Biomedical Engineering Shriners Hospital 2211 N. Oak Park Avenue Chicago, IL 60635 (312) 622-5400	Degree: Specialty: Assigned:	Ph.D., Biomedical Engr., 1981 Biomedical Engineering, Biomechanics AAMRL
Dr. Edward J. Hass Assistant Professor Franklin and Marshall College Whitely Psychology Lab. Box 3003 Lancaster, PA 17604 (717) 291-4202	Degree: Specialty: Assigned:	Ph.D., Psychology, 1983 Psychology HRL/OT
Dr. Doyle E. Hasty Associate Professor Engineering/Physics Motlow State College P O Box 860 Tullahoma, TN 37330 (615) 455-8511	Degree: Specialty: Assigned:	M.S., Engineering Administration, 1974 Engineering Administration AEDC

Dr. Michael A. Hayes Assistant Professor Dept. of Physics Dartmouth College Hanover, NH 03755 (603) 646-2973	Degree: Specialty: Assigned:	Ph.D., Plasma Physics, 1981 Plasma Physics AFGL
Dr. James C. Ho Professor of Physics & Chemistry Wichita State University Wichita, KS 67208 (316) 689-3190	Degree: Specialty: Assigned:	Ph.D., Chemistry, 1966 Chemistry APL
Dr. Peter F. Hoffman Assistant Professor Dept. of Mathematics University of Colorado Box 170, UCD Denver, CO 80202 (303) 556-4808	Degree: Specialty: Assigned:	Ph.D., Applied Mathematics, 1985 Applied Mathematics AEDC
Dr. Robert R. Hoffman Assistant Professor Dept. of Psychology Adelphi University Garden City, NY 11530 (516) 663-1055	Degree: Specialty: Assigned:	Ph.D., Experimental Psychology, 1976 Experimental Psychology ESD
Dr. Clifford C. Houk Professor of Chemistry Director Industrial Hygiene Program Ohio University Dept. of Chemistry Athens, OH 45701-2979 (614) 594-6205	Degree: Specialty: Assigned:	Ph.D., Inorganic Chemistry, 1966 Inorganic Chemistry OEHL
Dr. Ming-Shing Hung Associate Professsor Dept. of Administrative Sciences Kent State University Kent, OH 44242 (216) 672-2750	Degree: Specialty: Assigned:	Doctor of Business Admin., Management Science, 1973 Business Administration, Management Science LC

Dr. John M. Jobe Assistant Professor Decision Sciences Dept. Miami University of Ohio 229 Culler Hall (513) 529-7291	Degree: Specialty: Assigned:	Ph.D., Statistics, 1984 Statistics RADC
Dr. Glen Johnson Associate Professor Mechanical and Materials Engineering Vanderbilt University Box 8-B Nashville, TN 37235 (615) 322-0414	Degree: Specialty: Assigned:	Ph.D., Mechanical Engineering, 1978 Mechanical Engineering AEDC
Dr. Betty Jones Associate Professor Dir. of the EM Institute 830 Westview Dr., S.W. Atlanta, GA 30314 (404) 681-2800	Degree: Specialty: Assigned:	Ph.D., Biology, 1978 Biology SAM
Dr. Jeremy C. Jones Assistant Professor University of West Florida Systems Science USF LIB 630 CS & Eng Tampa, FL 33620 (813) 974-2114	Degree: Specialty: Assigned:	M.S., Physics, 1968 M.S., Math, 1965 Physics, Math AD
Dr. Marvin S. Keener Professor of Mathematics Oklahoma State University Math Department Stillwater, OK 74078 (405) 624-5789	Degree: Specialty: Assigned:	Ph.D., Mathematics, 1970 Mathematics AD
Dr. Yong S. Kim Assistant Professor Dept. of Civil Engineering The Catholic Univ. of America Washington, DC 20064 (202) 635-5163	Degree: Specialty: Assigned:	Ph.D., Civil Engineering, 1984 Civil Engineering ESC

Dr. Joel R. Klink
Professor
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(715) 836-5518

<u>Degree</u>: Ph.D., Organic Chemistry, 1964
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<u>Assigned</u>: RPL

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Management Sciences Dept.
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(617) 929-8051

<u>Degree</u>: Ph.D., Operations Research, 1983
<u>Specialty</u>: Operations Research
<u>Assigned</u>: ESD

Dr. Philipp G. Kornreich
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(315) 423-4447

<u>Degree</u>: Ph.D., Electrical Eng., 1967
<u>Specialty</u>: Electrical Engineering
<u>Assigned</u>: RADC

Dr. Mou-Liang Kung
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Norfolk State University
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<u>Degree</u>: Ph.D., Math, 1974
M.S., Computer Science, 1985
<u>Specialty</u>: Mathematics
<u>Assigned</u>: RADC

Dr. Charles E. Lance
Assistnat Professor
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Dept. of Psychology
Athens, GA 30602
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<u>Degree</u>: Ph.D., Psychology, 1985
<u>Specialty</u>: Psychology
<u>Assigned</u>: HRL/ID

Dr. David I. Lawson
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Stetson University
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(904) 734-4121

<u>Degree</u>: M.A., Mathematics, 1965
<u>Specialty</u>: Mathematics
<u>Assigned</u>: AD

Dr. Paul S.T. Lee Associate Professor Dept. of Business Admin. N.C. A&T State University 1601 E. Market Street Greensboro, NC 27410 (919) 379-7656	Degree: Specialty: Assigned:	Ph.D., Quantitative Methods and Research Economics, 1973 Quantitative Methods and Research Economics FDL
Dr. C. Randal Lishawa Physics Instructor Dept. of Chemistry and Physics Jefferson State University Birmingham, AL 35243 (205) 853-1200	Degree: Specialty: Assigned:	Ph.D., Physical Chemistry, 1981 Physical Chemistry AFGL
Dr. Cheng Liu Associate Professor Dept. of Engr. Tech. University of North Carolina Charlotte, NC 28223 (704) 597-4191	Degree: Specialty: Assigned:	M.S., Civil Engineering, 1963 Civil Engineering ESC
Dr. James C. LoPresto Professor of Astronomy Edinboro University Dept. of Physics Edbinboro, PA 16444 (814) 732-2469	Degree: Specialty: Assigned:	Ph.D., Astronomy, 1974 Astronomy AFGL
Dr. Stephen L. Loy Assistant Professor Iowa State University Management 374 Carver Ames, IA 50010 (515) 294-8108	Degree: Specialty: Assigned:	DBA, MIS, 1986 Management Information System HRL/LR
Dr. Nancy I. Lyons Associate Professor Dept. of Statistics University of Georgia Statistics Building Athens, GA 30602 (404) 542-5232	Degree: Specialty: Assigned:	Ph.D., Statistics, 1975 Statistics LMC

Dr. Robert L. Manicke Assistant Professor U.S. Naval Academy Math Department Attn: 9E Annapolis, MD 21402 (301) 267-3603	Degree: Specialty: Assigned:	Ph.D., Statistics, 1980 Statistics AAMRL
Dr. Arthur A. Mason Professor of Physics The University of Tennessee Space Institute Tullahoma, TN 37388 (615) 455-0631	Degree: Specialty: Assigned:	Ph.D., Physics, 1963 Physics AEDC
Dr. Curtis W. McDonald Professor of Chemistry Dept. of Chemistry Texas Southern University 3100 Cleborne Houston, TX 77004 (713) 527-7003	Degree: Specialty: Assignged:	Ph.D., Chemistry, 1962 Chemistry OEHL
Dr. Gopal M. Mehrotra Assistant Professor Wright State University Materials Science and Engineering Program Systems Engineering Dayton, OH 45435 (513) 873-2481	Degree: Specialty: Assigned:	Ph.D., Metallurgy, 1975 Metallurgy ML
Dr. Jorge L. Mendoza Associate Professor Texas A&M University Psychology Department College Station, TX 77843 (409) 845-0880	Degree: Specialty: Assigned:	Ph.D., Psychology, 1974 Psychology HRL/MO
Dr. Shreenivas Moorthy Associate Professor Texas A&I University Electrical Engineering & Computer Science Campus Box 192 Kingsville, TN 78363 (512) 595-2004	Degree: Specialty: Assigned:	Ph.D., Electrical Engineering, 1972 Electrical Engineering HRL/LR

Dr. Mary L. Morton-Gibson Assistant Professor Physics Department The Citadel Charleston, SC 29409 (803) 792-6943	Degree: Specialty: Assigned:	Ph.D., Physiology and Biophysics, 1970 Physiology and Biophysics SAM
Dr. Rex C. Moyer Associate Professor Trinity University Biology Dept. 715 Stadium Drive San Antonio, TX 78284 (512) 736-7242	Degree: Specialty: Assgined:	Ph.D., Microbiology, 1965 Microbiology SAM
Dr. V. Dakshina Murty Associate Professor University of Portland School of Engineering Portland, OR 97203 (503) 283-7379	Degree: Specialty: Assigned:	Ph.D., Engineering Mechanics, 1982 Engineering Mechanics FDL
Dr. Richard W. Nau Professor of Math and Computer Science Carleton College Northfield, MN 55057 (607) 663-4361	Degree: Specialty: Assigned:	Ph.D., Applied Math and Computer Science, 1970 Applied Math and Computer Science WL
Dr. Henry Nebel Associate Professor Alfred University Physics Department Alfred, NY 14802 (607) 871-2208	Degree: Specialty: Assigned:	Ph.D., Physics, 1967 Physics AFGL
Dr. Robert M. Nehs Associate Professor Dept. of Mathematical Sciences Texas Southern University 3100 Cleburne Avenue Houston, TX 77004 (713) 527-7915	Degree: Specialty: Assigned:	Ph.D., Mathematics, 1980 Mathematics AFGL

Dr. Douglas L. Oliver Assistant Professor University of Toledo Toledo, OH 43606 (419) 537-2885	Degree: Specialty: Assigned:	Ph.D., Mechanical Engineering, 1985 Mechanical Engineering APL
Dr. Philip D. Olivier Assistant Professor University of Texas at San Antonio Division of Engineering San Antonio, TX 78285 (512) 691-5565	Degree: Specialty: Assigned:	Ph.D., Electrical Engineering, 1980 Electrical Engineering HRL/ID
Dr. Harvey L. Paige Associate Professor Alfred University Dept. of Chemistry Alfred, NY 14802 (607) 871-2201	Degree: Specialty: Assigned:	Ph.D., Inorganic Chemistry, 1969 Inorganic Chemistry ML
Dr. Parsottam J. Patel Associate Professor Meharry Medical College Dept. of Microbiology Nashville, TN 37208 (615) 327-6760	Degree: Specialty: Assigned:	Ph.D., Microbiology, 1976 Microbiology SAM
Dr. Robert A. Patsiga Professor Dept. of Chemistry Indiana Univ. of Pennsylvania Indiania, PA 15705 (412) 357-2210	Degree: Specialty: Assigned:	Ph.D., Organic and Polymer Chemistry, 1962 Organic Polymer Chemistry ML
Dr. Martin A. Patt Associate Professor University of Lowell Dept. of Electrical Engineering 1 University Avenue Lowell, MA 01854 (617) 452-5000	Degree: Specialty: Assigned:	M.S., Science, Electrical Engineering, 1964 Electrical Engineering AFGL

Dr. Jacqueline G. Paver Research Associate Duke University Biomedical Engineering Dept. 136 Engineering Building Durham, NC 27706 (919) 684-6185	Degree: Specialty: Assigned:	Ph.D., Biomedical Engineering, 1984 Biomechanical Engineering AAMRL
Dr. Alexandru A. Pelin Associate Professor of Computer Science Florida International University Dept. of Mathematical Sciences Tamiami Campus Miami, FL 33199 (305) 554-3386	Degree: Specialty: Assigned:	Ph.D., Computer Science, 1977 Computer Science WL
Dr. Bernard J. Piersma Professor of Chemistry Houghton College Houghton, NY 14744 (716) 567-2211	Degree: Specialty: Assigned:	Ph.D., Physical Chemistry, 1965 Physical Chemistry FJSRL
Dr. Leonard Price Professor of Chemistry Xavier University of Louisiana Chemistry Department 7325 Palmetto Street New Orleans, LA 70125	Degree: Specialty: Assigned:	Ph.D., Organic Chemistry, 1962 Organic Chemistry SAM
Dr. Craig G. Prohazka Assistant Professor University of Lowell Dept. of Electrical Engineering Lowell, MA 01854 (617) 452-5000	Degree: Specialty: Assigned:	Ph.D., Electrical Engineering, 1981 Electrical Engineering RADC
Dr. L. Rai Pujara Assistant Professor Electrical Systems Engineering Wright State University Dayton, OH 45435 (513) 873-2456	Degree: Specialty: Assigned:	Ph.D., Mathematics, 1971 Electrical Sys. Engineering FDL

Dr. Richard S. Quimby Assistant Professor Worcester Polytechnic Institute Dept. of Physics 100 Institute Road Worcester, MA 01609 (617) 793-5490	Degree: Specialty: Assigned:	Ph.D., Physics, 1979 Physics RADC
Dr. Singiresu S. Rao Associate Professor School of Mechanical Engineering Purdue University West Lafayette, IN 47907 (317) 494-9766	Degree: Specialty: Assigned:	Ph.D., Engineering Design, 1971 Engineering Design FDL
Dr. Ralph J. Rascati Associate Professor Kennesaw College Biology Department Marietta, GA 30061 (404) 529-2878	Degree: Specialty: Assigned:	Ph.D., Biochemistry, 1975 Biochemistry OEHL
Dr. Kuldip S. Rattan Associate Professor Dept. of Electrical Systems Engineering Wright State University Dayton, OH 45435 (513) 873-2497	Degree: Specialty: Assigned:	Ph.D., Electrical Engineering, 1975 Electrical Engineering AAMRL
Dr. Barbara Rice Associate Professor Mathematics Dept. Alabama A&M University P O Box 326 Normal, AL 35762 (205) 859-7448	Degree: Specialty: Assigned:	Ph.D., Mathematics, 1965 Mathematics AD
Dr. Dan B. Rinks Assistant Professor Louisiana State University Dept. of Quantitative Business Analysis 3180 CEBA Baton Rouge, LA 70803 (504) 388-5318	Degree: Specialty: Assigned:	Ph.D., Quantitative Management Science, 1978 Quantitative Mgmt. Science LMC

Dr. William P. Robey Assistant Professor Electronics & Computer Technology Oklahoma State University 202CR Stillwater, OK 74078 (405) 624-5716	Degree: Specialty: Assigned:	B.S., Engineering Physics, 1968 Engineering Physics AFGL
Dr. Kenneth C. Russell Professor Massachusetts Institute of Technology Materials Science Nuclear Engineering Room 13-5066 77 Massachusetts Avenue Cambridge, MA 02139 (617) 253-3328	Degree: Specialty: Assigned:	Ph.D., Metall. Engineering, 1964 Metallurgy Engineering ML
Dr. Sally A. Sage Assistant Professor West Georgia College Dept. of Math/Computer Science Carrollton, GA 30118 (404) 834-1380	Degree: Specialty: Assigned:	M.S., Computer Science, 1979 Computer Science AD
Dr. Mo Samimy Assistant Professor Ohio State University Mechanical Engineering Dept. 206 W. 18th Avenue Columbus, OH 43210 (614) 422-6988	Degree: Specialty: Assigned:	Ph.D., Mechanical Engineering, 1984 Mechanical Engineering APL
Dr. John F. Schaefer Associate Professor Dept. of Electrical Engineering The Citadel Charleston, SC 29409 (803) 792-4899	Degree: Specialty: Assigned:	Ph.D., Electrical Engineering, 1965 Electrical Engineering ESC
Dr. John R. Schneider Professor of Physics University of Dayton Physics Department Dayton, OH 45469 (513) 229-1000	Degree: Specialty: Assigned:	Ph.D., Physics, 1965 Physics ML

Dr. Richard M. Schori Professor of Mathematics Oregon State University Math Department Corvallis, OR 97331 (503) 754-4686	<u>Degree</u>: <u>Specialty</u>: <u>Assigned</u>:	Ph.D., Mathematics, 1964 Mathematics SAM
Dr. William D. Schulz Professor Eastern Kentucky University Dept. of Chemistry Moore 337, EKU Richmond, KY 40475 (606) 622-1463	<u>Degree</u>: <u>Specialty</u>: <u>Assigned</u>:	Ph.D., Analytical Chemistry, 1975 Analytical Chemistry ESC
Dr. Meckinley Scott Professor University of Alabama Mathematics Department Box 1416 University, AL 35486 (206) 348-1985	<u>Degree</u>: <u>Specialty</u>: <u>Assigned</u>:	Ph.D., Statistics, 1964 Statistics AD
Dr. Martin A. Shadday, Jr. Assistant Professor University of South Carolina Mechanical Engineering College of Engineering Columbia, SC 29208 (803) 777-7118	<u>Degree</u>: <u>Specialty</u>: <u>Assigned</u>:	Ph.D., Mechanical Engineering, 1982 Mechanical Engineering WL
Dr. Nisar Shaikh Assistant Professor University of Nebraska-Lincoln Dept. of Engineering Mechanics 212 Bancroft Hall Lincoln, NE 68588-0437 (402) 472-2384	<u>Degree</u>: <u>Specialty</u>: <u>Assigned</u>:	Ph.D., Applied Mechanics, 1982 Applied Mathematics ML
Dr. Dolores C. Shockley Associate Professor Meharry Medical College Dept. of Pharmacology 1005 D.B. Todd Blvd. Nashville, TN 37208 (615) 327-6510	<u>Degree</u>: <u>Specialty</u>: <u>Assigned</u>:	Ph.D., Pharmacology, 1955 Pharmacology SAM

Dr. William D. Shontz Associate Professor Montana State University Department of Psychology Bozeman, MT 59717 (406) 994-5180	Degree: Specialty: Assigned:	Ph.D., Experimental Psychology, 1967 Psychology AFHRL/OTE
Dr. William D. Siuru, Jr. Senior Research Associate Space and Flight Systems Lab. University of Colorado at Colorado Springs 1867 Austin Bluffs Parkway Colorado Springs, CO 80907 (303) 593-3573	Degree: Specialty: Assigned:	Ph.D., Mechanical Engineering, 1975 Mechanical Engineering FJSRL
Dr. Boghos D. Sivazlian Professor The University of Florida Dept. of Industrial and Systems Engineering 303 Weil Hall Gainesville, FL 32611 (904) 392-1464	Degree: Specialty: Assigned:	Ph.D., Operations Research, 1966 Operations Research AD
Dr. Siavash H. Sohrab Assistant Professor Dept. of Mechanical and Nuclear Engineering Northwestern University Technical Institute Evanston, IL 60201 (312) 491-3572	Degree: Specialty: Assigned:	Ph.D., Engineering Physics, 1981 Engineering Physics RPL
Dr. Stuart R. Stock Assistant Professor Georgia Institute of Technology School of Materials Engineering Atlanta, GA 30332-0245 (404) 894-6882	Degree: Specialty: Assigned:	Ph.D., Metallurgy, 1983 Metallurgy ML
Dr. James E. Sturm Professor Dept. of Chemistry #6 Lehigh University Bethlehem, PA 18015 (215) 861-3477	Degree: Specialty: Assigned:	Ph.D., Physical Chemistry, 1957 Physical Chemistry AFGL

Dr. Edgar C. Tacker Professor of Electrical Eng. University of Tulsa 600 S. College Tulsa, OK 74104 (918) 592-6000	Degree: Specialty: Assigned:	Ph.D., Electrical Engineering, 1964 Electrical Engineering AAMRL
Dr. Nicholas E. Takach Assistant Professor Dept. of Chemistry University of Tulsa 600 S. College Tulsa, OK 74104 (918) 592-6000	Degree: Specialty: Assigned:	Ph.D., Chemistry, 1979 Chemistry RPL
Dr. Arjun Tan Assistant Professor Alabama A&M University Physics Dept. Box 447 Normal, AL 35762 (205) 859-7470	Degree: Specialty: Assigned:	Ph.D., Physics, 1979 Physics AEDC
Dr. Robert P. Taylor Assistant Professor Mech. and Nuclear Engr. Dept. Mississippi State University Drawer ME Mississippi State, MS 39762 (601) 325-7316	Degree: Specialty: Assigned:	Ph.D., Mechanical Engineering, 1983 Mechanical Engineering APL
Dr. Ken Tomiyama Assistant Professor Pennsylvania State University Dept. of Electrical Engineering 121 E.E. East University Park, PA 16802 (814) 865-7667	Degree: Specialty: Assigned:	Ph.D., System Science, 1977 System Science AL
Dr. Phillip D. Tomporowski Assistant Professor Dept. of Psychology University of Alabama Box 2968 University, AL 35486 (205) 348-1936	Degree: Specialty: Assigned:	Ph.D., Experimental Psychology, 1977 Experimental Psychology HRL/MO

Dr. Timothy R. Troutt Assistant Professor Washington State University Dept. of Mechanical Engineering Sloan Hall 201 Pullman, WA 99164-2920 (509) 335-4375	Degree: Specialty: Assigned:	Ph.D., Mechanical Engineering, 1978 Mechanical Engineering FJSRL
Dr. C. Randall Truman Assistant Professor Mechanical Engineering University of New Mexico Albuquerque, NM 87131 (505) 277-6296	Degree: Specialty: Assigned:	Ph.D., Mechanical Engineering, 1983 Mechanical Engineering WL
Dr. Roy M. Ventullo Associate Professor Dept. of Biology University of Dayton 300 College Park Dayton, OH 45469-0001 (513) 229-2503	Degree: Specialty: Assigned:	Ph.D., Microbiology, 1978 Microbiology ESC
Dr. Doris J. Walker-Dalhouse Director of Independent/ Home-Study Programs Associate Professor of Reading Jackson State University P O Box 17120 Jackson, MS 39217 (601) 968-9684	Degree: Specialty: Assigned:	Ph.D., Reading Education, 1977 Reading Education HRL/ID
Dr. Donald W. Welch Research Scientist Texas A&M University Hyperbaric Laboratory College Station, TX 77843 (409) 845-4027	Degree: Specialty: Assigned:	Doctorate, Microbiology, 1985 Microbiology WHMC
Dr. Albert R. Wellens Associate Professor and Associate Chairman Dept. of Psychology University of Miami P O Box 248185 Coral Gables, FL 33158 (305) 284-2814	Degree: Specialty: Assigned:	Ph.D., Experimental Social Psychology, 1972 Experimental Social Psychology AAMRL

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Degree: Ph.D., Applied Mathematics, 1982
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Assigned: RADC

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Degree: Ph.D., Educational Psychology, 1971
Specialty: Educational Psychology,
Assigned: SAM

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Degree: Ph.D., Physiology, Pharmacology, 1978
Specialty: Hyperbaric Medicine,
Assigned: SAM

Dr. Dennis W. Whitson
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Degree: Ph.D., Physics, 1969
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Assigned: AL

Dr. Shirley A. Williams
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Degree: Ph.D., Physiology and Biophysics, 1985
Specialty: Physiology and Biophysics
Assigned: OEHL

Dr. Billy R. Wooten
Professor
Dept. of Psychology
Brown University
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(401) 863-2330

Degree: Ph.D. of Philosophy, Psychology, 1970
Specialty: Philosophy, Psychology
Assigned: HRL/OT

Dr. Daniel W. Yannitell Associate Professor Mechanical Engineering Dept. Louisiana State University Baton Rouge, LA 70803 (504) 388-5972	<u>Degree</u>: <u>Specialty</u>: <u>Assigned</u>:	Ph.D., Theoretical and Applied Mechanics, 1967 Theoretical and Applied Mechanics RPL
Dr. Tsun-wai G. Yip Assistant Professor Aero-Astro Engineering Dept. Ohio State University 2300 West Case Road Columbus, OH 43220 (614) 422-1241	<u>Degree</u>: <u>Specialty</u>: <u>Assigned</u>:	Ph.D., Aero-Astro Engineering, 1984 Aeronautics-Astronautics Engineering FDL
Dr. Robert L. Yolton Associate Professor of Psychophysiology Pacific University College of Optometry Forest Grove, OR 97116 (503) 357-6151	<u>Degree</u>: <u>Specialty</u>: <u>Assigned</u>:	Ph.D., Psychology, 1975 Doctor of Optometry, 1975 Psychology, Optometry AAMRL
Dr. Richard W. Young Associate Professor Aerospace Engineering and Engineering Mechanics University or Cincinnati ML 70 Cincinnati, OH 45242 (513) 475-3014	<u>Degree</u>: <u>Specialty</u>: <u>Assigned</u>:	Ph.D., Applied Mechanics, 1975 Applied Mechanics FDL
Dr. Ajmal Yousuff Assistant Professor Drexel University Dept. of Mechanical Enginnering and Mechanics Philadelphia, PA 19104 (215) 895-1868	<u>Degree</u>: <u>Specialty</u>: <u>Assigned</u>:	Ph.D., Aeronautics, 1983 Aeronautics FDL
Dr. David D. Zeigler Adjunct Faculty North Texas State University Biology Department Denton, TX 76203 (817) 565-3622	<u>Degree</u>: <u>Specialty</u>: <u>Assigned</u>:	Ph.D., Zoology, 1984 Zoology AD

Dr. Henry Zmuda Assistant Professor Stevens Institute of Technology Electrical Engineering Dept. Castle Point Station Hoboken, NJ 07030 (201) 420-5507	Degree: Specialty: Assigned:	Ph.D., Electrical Engineering, 1984 Electrical Engineering RADC
Dr. George W. Zobrist Professor of Computer Science Dept. of Computer Science University of Missouri-Rolla Rolla, MO 65401 (314) 341-4836	Degree: Specialty: Assigned:	Ph.D., Electrical Engineering, 1965 Electrical Engineering AL

APPENDIX II C

PARTICIPANT LABORATORY ASSIGNMENT

C. PARTICIPANT LABORATORY ASSIGNMENT (Page 1)

1986 USAF/UES SUMMER FACULTY RESEARCH PROGRAM

AERO PROPULSION LABORATORY (AFWAL/APL)
(Wright-Patterson Air Force Base)

1. Lea Chen
2. Jacob Chung
3. Shirshak Dhali
4. Dennis Flentge
5. James Ho
6. Douglas Oliver
7. Mo Samimy
8. Robert Taylor

ARMAMENT LABORATORY (AD)
(Eglin Air Force Base)

1. George D. Catalano
2. Mark A. Fulk
3. Jeremy C. Jones
4. Marvin S. Keener
5. David I. Lawson
6. Barbara C. Rice
7. Sally A. Sage
8. Meckinley Scott
9. Boghos D. Sivazlian
10. David D. Zeigler
11. Probhat Hajela

ARMSTRONG AEROSPACE MEDICAL RESEARCH LABORATORY (AAMRL)
(Wright-Patterson Air Force Base)

1. Rashpal S. Ahluwalia
2. Patrick R. Hannon
3. Gerald F. Harris
4. Robert L. Manicke
5. Jacqueline G. Paver
6. Kuldip S. Rattan
7. Edgar C. Tacker
8. Albert R. Wellens
9. Robert L. Yolton

ARNOLD ENGINEERING DEVELOPMENT CENTER (AEDC)
(Arnold Air Force Station)

1. Albert C. Giere
2. Doyle E. Hasty
3. Peter E. Hoffman
4. Glen E. Johnson
5. Arthur A. Mason
6. Arjun Tan

AVIONICS LABORATORY (AFWAL/AL)
(Wright-Patterson Air Force Base)

1. Rex L. Berney
2. John Y. Cheung
3. Ronald L. Greene
4. William Grosky
5. Ken Tomiyama
6. Dennis W. Whitson
7. George W. Zobrist

BUSINESS RESEARCH MANAGEMENT CENTER (BRMC)
(Wright-Patterson Air Force Base)

1. Jeffrey Camm
2. Thomas Gulledge

C. PARTICIPANT LABORATORY ASSIGNMENT (Page 2)

ELECTRONICS SYSTEMS DIVISION (ESD)
(Hanscom Air Force Base)

1. Robert Hoffman
2. Stephan Kolitz

ENGINEERING AND SERVICES CENTER (ESC)
(Tyndall Air Force Base)

1. Thomas Carney
2. William Cooper
3. Yong Kim
4. Cheng Liu
5. John Schaefer
6. William Schulz
7. Roy Ventullo

FLIGHT DYNAMICS LABORATORY (AFWAL/FDL)
(Wright-Patterson Air Force Base)

1. George Becus
2. Bor-Chin Chang
3. Peter Disimile
4. Michael Doria
5. George Doyle
6. Franklin Eastep
7. Paul Lee
8. V. Dakshina Murty
9. L. Pujara
10. Singiresu Rao
11. Tsun-Wai Yip
12. Warren Young
13. Ajmal Yousuff

FRANK J. SEILER RESEARCH LABORATORY (FJSRL)
(USAF Academy)

1. David Anderson
2. David Barnhart
3. Wu Cheng
4. Thaddeus Englert
5. John George
6. Bernard Piersma
7. William Siuru
8. Timothy Troutt

GEOPHYSICS LABORATORY (AFGL)
(Hanscom Air Force Base)

1. Jon Ahlquist
2. Frank Battles
3. Wolfgang Christian
4. Donald Collins
5. Patrick Gannon
6. Michael Hayes
7. C. Lishawa
8. James LoPresto
9. Henry Nebel
10. Robert Nehs
11. Martin Patt
12. William Robey
13. James Sturm

HUMAN RESOURCES LABORATORY/ID (HRL/ID)
(Lowry Air Force Base)

1. Doris Ginn
2. Charles Lance
3. Philip Olivier
4. Doris Walker-Dalhouse

HUMAN RESOURCES LABORATORY/LR (HRL/LR)
(Wright-Patterson Air Force Base)

1. Patricia Boggs
2. Raghava Gowda
3. Stephen Loy
4. Shreenivas Moorthy

C. PARTICIPANT LABORATORY ASSIGNMENT (Page 3)

HUMAN RESOURCES LABORATORY/MO (HRL/MO)
(Brooks Air Force Base)
1. Richard Cox
2. Jorge Mendoza
3. Phillip Tomporowski

HUMAN RESOURCES LABORATORY/OT (HRL/OT)
(Williams Air Force Base)
1. Garvin Chastain
2. Edward Hass
3. William Shontz
4. Billy Wooten

LOGISTICS COMMAND (LC)
(Wright-Patterson Air Force Base)
1. Ming-Shing Hung

LOGISTICS MANAGEMENT CENTER (LMC)
(Gunter Air Force Base)
1. Nancy Lyons
2. Dan Rinks

MATERIALS LABORATORY (AFWAL/ML)
(Wright-Patterson Air Force Base)
1. Shive Chaturvedi
2. Derald Chriss
3. Lokesh Dharani
4. Gerald Graves
5. Gopal Mehrota
6. Harvey Paige
7. Robert Patsiga
8. Kenneth Russell
9. James Schneider
10. Nisar Shaikh
11. Stuart Stock

OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (OEHL)
(Brooks Air Force Base)
1. Clifford Houk
2. Curtis McDonald
3. Ralph Rascati
4. Shirley Williams

ROCKET PROPULSION LABORATORY (RPL)
(Edwards Air Force Base)
1. William Grissom
2. Joel Klink
3. Siavash Sohrab
4. Nicholas Takach
5. Danial Yannitell

C. PARTICIPANT LABORATORY ASSIGNMENT (Page 4)

ROME AIR DEVELOPMENT CENTER (RADC)
(Griffiss Air Force Base)

1. William Day
2. Donald Hanson
3. John Jobe
4. Philipp Kornreich
5. Mou-Liang Kung
6. Craig Prohazka
7. Richard Quimby
8. Stephen Welstead
9. Henry Zmuda

SCHOOL OF AEROSPACE MEDICINE (SAM)
(Brooks Air Force Base)

1. Vito Del Vecchio
2. Phillip Bishop
3. Clifford Burgess
4. Hoffman Chen
5. Brenda Claiborne
6. Thomas Gosink
7. Ramesh Gupta
8. Frank Hadlock
9. Betty Jones
10. Mary Morton-Gibson
11. Rex Moyer
12. Parsottam Patel
13. Leonard Price
14. Richard Schori
15. Dolores Shockley
16. Shih-sung Wen
17. Stanley Whidden

WEAPONS LABORATORY (WL)
(Kirtland Air Force Base)

1. Albert Biggs
2. James Brown
3. Fabian Hadipriono
4. Richard Nau
5. Alexandru Pelin
6. Martin Shadday
7. C. Truman

WILLFORD HALL MEDICAL CENTER
(Lackland Air Force Base)

1. Donald Welch

APPENDIX III

A. Listing of Research Reports Submitted in the 1986 Summer Faculty Research Program

B. Abstracts of the 1986 Summer Fellow's Research Reports

APPENDIX III A

RESEARCH REPORTS

1986 SUMMER FACULTY RESEARCH PROGRAM

Technical Report Number	Title	Professor
Volume I		
1	Weather Forecast Evaluation by Decomposition of the Wind Field into Rotational and Divergent Components	Dr. Jon E. Ahlquist
2	Specification of a Vision Based Navigation System for a Mobile Robot	Dr. Rashpal S. Ahluwalia
3	An EPR Study of the Intermediate Radicals Produced in the Catalyzed and Uncatalyzed Thermal Decomposition of Dinitrotoluenes	Dr. David R. Anderson
4	An EPR and HPLC Study of the Mechanisms and Kinetics of TNT with Various Reagents	Dr. David M. Barnhart
5	Atmospheric Turbulence Effects on Optical Beams	Dr. Frank P. Battles
6	Some Issues in the Modeling and Control of Large Flexible Space Structures	Dr. Georges A. Becus
7	Fresnel Drag Unit and Registration Optics for the Ring Laser Gyro	Dr. Rex L. Berney
8	Corrugated Waveguides for Slow Waves	Dr. Albert W. Biggs
9	Work Capacity Increased in High Ambient Temperature Chemical Warfare Environments Through Use of Intermittent Work and Individual Liquid Cooling	Dr. Phillip A. Bishop
10	Factors Impacting Adaptation of Decision Support Systems: An Interdisciplinary Approach	Dr. Patricia T. Boggs
11	American Ballistic Missile Defense, 1955-1979	Dr. James A. Brown

12	Data Management Within the School of Aerospace Medicine	Dr. Clifford G. Burgess
13	Measuring Production Rate in Aircraft Repricing Models	Dr. Jeffrey D. Camm
14	A Comparative Study and Evaluation of Four Atmospheric Dispersion Models with Present or Potential Utility in Air Force Operations	Dr. Thomas A. Carney
15	Turbulent Flow Over an Embedded, Rectangular Cavity	Dr. George D. Catalano
16	Fast Iterative Algorithm for 2-Block $H\infty$ Optimization Problems	Dr. Bor-Chin Chang
17	Effects of Unchanging Clutter on Peripherally-Precued Covert Attention Shifts	Dr. Garvin Chastain
18	Thermo-Mechanical Behavior of High Temperature Composites: A Review	Dr. Shive K. Chaturvedi
19	Structure of Jet Diffusion Flames	Dr. Lea D. Chen
20	Serum Phospholipid and Cholesterol Ester Fatty Acids as Risk Predictors for Coronary Artery Disease	Dr. Hoffman Hor-Fu Chen
21	A Laser Study of Sulfur Hexafluoride	Dr. Wu C. Cheng
22	A Preliminary Study of the Characteristics of Various Digital Signal Processing Techniques in Receivers	Dr. John Yan-Poon Cheung
23	An FTIR Study of the Isomerization of Isoimides	Dr. Derald Chriss
24	Multiphoton Ionization and Infrared Generation in a Cesium Heat Pipe Oven	Dr. Wolfgang Christian
25	A Numerical Simulation of the Liquid-Metal Dual-Latent Heat Packed Bed Thermal Energy Storage System	Dr. Jacob Nan-Chu Chung
26	An Ultrastructural Study of Mossy Fiber Terminals Isolated from the Mammalian Brain	Dr. Brenda J. Claiborne
27	Evaluation and Calibration of the AFGL Ultraviolet Imaging System	Dr. Donald F. Collins

28	A Dispersion-Corrected HPLC/FACP Method for Measuring Sorption Isotherms of Substituted Aromatics on Soil Organic Matter	Dr. William T. Cooper
29	A Study Designed to Enhance the Predictive Validity of the Two-Hand Coordination and Complex Coordination Psychomotor Tests	Dr. Richard H. Cox
30	Truth Maintenance and Learning in Knowledge-Based Systems	Dr. William B. Day
31	Cloning of Mycoplasma Genomic Libraries in E. Coli	Dr. Veto G. DelVecchio
32	A Monte Carlo Simulation of the Electron Motion in Silane and the Ambipolar Diffusion of a Multi-component Plasma	Dr. Shirshak K. Dhali
33	Modeling of Failure Mechanisms in Brittle Matrix High Temperature Composites	Dr. Lokesh R. Dharani
34	The Effects of Surface Roughness on Turbulent Boundary Layer Separation at Hypersonic Speeds	Dr. Peter J. Disimile
35	A Numerical Investigation Into the Acoustic Disturbance of a Laminar Flow Field Over an Airfoil at High Angle of Attack	Dr. Michael L. Doria
36	Computer Aided Engineering Techniques in Aircraft Landing Gear Analysis	Dr. George R. Doyle, Jr.
37	Structural Modification to Enhance the Active Control of Aeroelastic Instabilities	Dr. Franklin E. Eastep
38	Laser-Induced Breakdown of Sulfur-hexafluoride	Dr. Thaddeus J. Englert
39	Carbon Residue Studies with a Microcarbon Residue Tester	Dr. Dennis R. Flentge
40	Symbolic Processing In Automatic Target Recognition	Dr. Mark A. Fulk
41	Response of Downslope and Florida Mesoscale Wind Systems to Physiographic Features	Dr. Patrick Gannon, Sr.

42	Theoretical Studies in: I. Development of a Model for Tribological Studies II. Modes of Decomposition of Stabilized Explosives	Dr. John K. George
43	The Electron Number Density of a Plasma Derived from Measurements of Radar Cross-Sections	Dr. Albert C. Giere
44	Text Linguistics and the Assessment of Military Rhetoric	Dr. Doris O. Ginn
45	Chemical Defense Detection Devices	Dr. Thomas A. Gosink
46	Structured Techniques for IMIS (Integrated Maintenance Information Systems) Software Development	Dr. Raghava G. Gowda
47	Multiple Processor System Design for AI-Based Process Control	Dr. Gerald R. Graves
48	Wannier Excitons in GaAs-$Ga_{1-x}Al_xAs$ Heterostructures: Magnetic Field Parallel to the Interfaces	Dr. Ronald L. Greene
49	A Feasibility Study of Liquid Rocket Engine Combustion Diagnostics	Dr. William M. Grissom
50	A Unified Approach to the Linear Camera Calibration Problem	Dr. William I. Grosky
51	Measuring Production Rate in Aircraft Repricing Models	Dr. Thomas R. Gulledge
52	Estimation of Relative Risk in Epidemiological Studies	Dr. Ramesh C. Gupta
53	Development of a Rule-Based Expert System for Damage Assessment of Air Force Base Structures	Dr. Fabian C. Hadipriono
Volume II		
54	Simulation of the Cardiac Conduction System	Dr. Frank O. Hadlock
55	A Framework of an Optimum Synthesis Environment for the Hydrocode EPIC-2	Dr. Prabhat Hajela
56	Modeling of Human Body Movement	Dr. Patrick R. Hannon
57	Fields of a Slot Antenna on a Half-Space Fed by Coplanar Waveguide Using the Method of Moments	Dr. Donald F. Hanson

58	Effect of Low Frequency Vibration on Bone Remodelling in the Rhesus Os Calcis	Dr. Gerald F. Harris
59	Mental Rotation and Perspective-Taking Skills In Pilots and Non-Pilots	Dr. Edward J. Hass
60	Revitalization of Operations and Controls for the Turbine Engine Test Cells at the Arnold Engineering Development Center	Dr. Doyle E. Hasty
61	Operation of the Electron Ion Momentum Transfer Instability Mechanism in Moderately Dense Plasmas	Dr. Michael A. Hayes
62	Evaluation of Several High Strength Composite Conductors	Dr. James C. Ho
63	The Locally Implicit Method for Computational Aerodynamics	Dr. Peter F. Hoffman
64	Procedures for Efficiently Extracting the Knowledge of Experts	Dr. Robert R. Hoffman
65	Fluorescent Dye Binding Analysis for the Identification of Asbestos	Dr. Clifford C. Houk
66	Thrust Computing System	Dr. Ming-Shing Hung
67	Estimation and Discrimination Procedures for a New Measure of Maintainability/Reliability	Dr. John M. Jobe
68	Design Synthesis of Nonlinear Systems	Dr. Glen E. Johnson
69	Analysis of FPS Tracking Radar for Error Reduction and Modeling	Dr. Jeremy C. Jones
70	Organophosphate Inhibitors: Repeated Low Dose Effects of Diisopropyfluro-phosphate on Serotinin Receptors in Rat Cortex	Dr. Betty R. Jones
71	Optimal Filtering	Dr. Marvin S. Keener
72	A Preliminary Study for Centrifuge Model Testing of Semihardened Concrete Arches	Dr. Yong S. Kim

73	The Synthesis of Fluorodinitroethylnitraminoalkyl Nitrates and Compatibility Studies of GAP-Nitrate and TAET	Dr. Joel R. Klink
74	Reliability in Satellite Communication Networks	Dr. Stephan E. Kolitz
75	Investigation of Vapor Deposited Aluminum Alloy Films	Dr. Philipp G. Kornreich
76	Modification of Priority Handling Algorithm in the Integrated Node Network	Dr. Mou-Liang Kung
77	Ability, Experience and Task Characteristic Predictors of Performance	Dr. Charles E. Lance
78	Multiaperture Optical Systems and Neural Networks Capable of the Detection of Motion, Speed, Direction and Distance	Dr. David I. Lawson
79	Experimental Design and Transparency Durability Prediction	Dr. Paul S.T. Lee
80	Ion-Molecule Reactions of H_2O^+/H_2O, $N_2{}^+/CO_2$, and N^+/CO_2	Dr. C. Randal Lishawa
81	Study of Rutting of Asphalt Pavement Under High Tire Pressure and Temperature	Dr. Cheng Liu
82	Selected Spectral Studies of the Sun	Dr. James C. LoPresto
83	Visual Problem-Structuring and Hemispheric Processes of the Human Brain	Dr. Stephen L. Loy
84	Review and Evaluation of a Refueling Capability Assessment Model	Dr. Nancy I. Lyons
85	Statistical Pattern Recognition Modelling of Visual Perceptions	Dr. Robert L. Manicke
86	An Experimental Design to Verify the AFGL FASCOD2 for Water Vapor and Carbon Dioxide at Low Temperatures and Pressures	Dr. Arthur A. Mason
87	The Determination of Lead in Blood	Dr. Curtis W. McDonald

88	Compatibility of Reinforcement and Matrix Phases in Composite Materials for High-Temperature, Aerospace Applications	Dr. Gopal M. Mehrotra
89	Empirical Confidence Intervals for a Validity Coefficient Under Range Restriction: An Application of the Bootstrap	Dr. Jorge L. Mendoza
90	Human Factors Analysis of a Micro-Computer-Based Maintenance System for Advanced Combat Aircrafts	Dr. Shreenivas Moorthy
91	Evaluation of a Computer Model to Predict Thermal Retinal Damage from LASER Radiation	Dr. Mary L. Morton-Gibson
92	Chlamydomonas Phototaxis as a Simple System for Testing the Effect of Drugs on Vision	Dr. Rex C. Moyer
93	An Investigation of the Utility of Computational Fluid Dynamics in the Prediction of Structural Active Cooling	Dr. V. Dakshina Murty
94	A Model for a Coordinated System of Parallel Expert Systems for Autonomous Satellites	Dr. Richard W. Nau
95	CO_2 (001) Vibrational Temperatures in the 50 to 150 KM Altitude Range	Dr. Henry Nebel
96	A Study of the Finite Element Method in Limited Area Weather Prediction Modeling	Dr. Robert M. Nehs
97	Issues Related to Lithium and Lithium-Hydride Thermal Storage Spheres	Dr. Douglas L. Oliver
98	A Network Tutor Based on the Heuristic of Polya	Dr. Philip D. Olivier
99	Oxidative Stability and Related Studies of Silahydrocarbons	Dr. Harvey L. Paige
100	Cleansing of Bone-Marrow by Lymphokine Activated Killer Cells (LAK-Cells)	Dr. Parsottam J. Patel
101	All-Aromatic Rod-Like Polymers Based on Intramolecular Cycloadditions: Model Compound Study	Dr. Robert A. Patsiga

102	Computer Software Executable Image Efficiency in Real-Time LIDAR Applications	Dr. Martin A. Patt
103	A Biomechanical Study of Anthropomorphic Head-Neck Systems	Dr. Jacqueline G. Paver
104	Automatic Program Generation from Specifications Using PROLOG	Dr Alexandru A. Pelin
105	Electrochemistry in Room Temperature Molten Salt Systems	Dr. Bernard J. Piersma
106	Effects of Acceleration Stress Upon Blood Lipid Levels	Dr. Leonard Price
Volume III		
107	The Inter-Site Communication Services Required by a Distributed Operating System	Dr. Craig G. Prohazka
108	A Computer-Aided Method of Designing Control Systems Incorporating Aircraft Flying Qualities	Dr. L. Rai Pujara
109	Infrared to Visible Light Conversion in Rare Earth Doped Heavy Metal Fluoride Glasses	Dr. Richard S. Quimby
110	Optimization of Actively Controlled Structures Using Multiobjective Programming Techniques	Dr. Singiresu S. Rao
111	Development of a Rapid and Sensitive Assay Procedure for the Detection of the Protozoan Parasite Giardia lamblia in Drinking Water Supplies	Dr. Ralph J. Rascati
112	State Variable Model of the Cardiovascular System and a Controller Design for an Anti-G Suit	Dr. Kuldip S. Rattan
113	A Comparison of Two Mathematical Systems for a Standard Image Algebra	Dr. Barbara S. Rice
114	Multi-Echelon Inventory Models for EOQ Items	Dr. Dan B. Rinks
115	Preliminary Development of a Global Positioning System Package for use in Determining Exact Position of AFGL Research Balloons at Precise Time	Dr. William P. Robey

116	Kinetic Processes in Advanced Alloys	Dr. Kenneth C. Russell
117	Computer Modeling of Infrared Signatures	Dr. Sally A. Sage
118	Swirling Flows in Dump Combustors	Dr. Mo Samimy
119	Results of a Brief Investigation of Two Alternative Energy Systems	Dr. John F. Schaefer
120	Raman Spectroscopic Investigations on Group IIIA Doped Silicon Crystals	Dr. James R. Schneider
121	An Intentional Tutor	Dr. Richard M. Schori
122	Polynuclear Aromatic Hydrocarbons in Particulate Turbine Engine Exhaust and from Combustion of Single Compound Fuels	Dr. William D. Schulz
123	Systems Effectiveness Concerning Vulnerability of Hardened Targets to a Variety of Weapons	Dr. Meckinley Scott
124	Resolution of Laser Beam Intensity Spots by the Target Plate Measurement Technique	Dr. Martin A. Shadday
125	Propagation of Lamb Waves in Fibrous Composite Materials	Dr. Nisar Shaikh
126	Pharmacokinetics of Certain Substances of Abuse: A Review of the Literature	Dr. Dolores C. Shockley
127	Contrast Sensitivity at Low Luminance Levels	Dr. William D. Shontz
128	Aerodynamic Parameters for a Rapidly Pitching Airfoil	Dr. William D. Siuru
129	Aircraft Sortie Effectiveness Model	Dr. Boghos D. Sivazlian
130	Combustion Under Supercritical State and Influence of Radiation on Droplet Combustion	Dr. Siavash H. Sohrab
131	X-Ray Topographic Characterization of Si and GaAs	Dr. Stuart R. Stock
132	Assessment of Maximum Entropy Method Software by Operation on Interferograms of Model Spectra	Dr. James E. Sturm

133	AI and Large-Scale Systems Approaches to Enhanced Situation Awareness in Missile Warning Systems	Dr. Edgar C. Tacker
134	Feasibility Investigation of Single-Step Nitrations of Organometallics by Nitronium Triflate	Dr. Nicholas E. Takach
135	Dissipation of Plasma Cloud Generated by Third Stage Rocket Separation	Dr. Arjun Tan
136	Surface Roughness Effects on Heat Transfer and Skin Friction	Dr. Robert P. Taylor
137	Atmospheric Modeling for Operational Tactical Decision Aid	Dr. Ken Tomiyama
138	Vigilance Behavior of Military Personnel: A Study of Individual Differences	Dr. Phillip Tomporowski
139	An Investigation of Unsteady Vorticity Production by a Pitching Airfoil	Dr. Timothy R. Troutt
140	A Study of Turbulence Models for Predicting Aero-Optic Interactions	Dr. C. Randall Truman
141	Analysis and Fate of Organic Components of Aqueous Film Forming Foams	Dr. Roy M. Ventullo
142	Comprehension and Cohesion of Text	Dr. Doris J. Walker-Dalhouse
143	Effect on Hyperoxia on the Permeability of the Blood-Brain Barrier in the Rat	Dr. Donald W. Welch
144	Multimodal Information Exchange for Individual and Group Problem Solving	Dr. Albert R. Wellens
145	Preliminary Study of an Optical Implementation of the Conjugate Gradient Algorithm	Dr. Stephen T. Welstead
146	Assessing Cognitive Skills Through A Supervisory Control Simulation	Dr. Shih-sung Wen
147	Hyperbaric (3ATA) Oxygen 100% Therapy as an Adjuvant in the Treatment of Resuscitated (Brooke Formula) Guinea Pigs' Burn (3^{o}, 50 BSA) Shock	Dr. Stanley J. Whidden
148	Analytical Computer Modeling of the NPN BICFET Device	Dr. Dennis W. Whitson

149	Women in the Workforce: Occupational Pulmonary Disorders	Dr. Shirley A. Williams
150	Mechanisms of Chromatic Contrast	Dr. Billy R. Wooten
151	Continuum Analysis of Low Pressure Tube and Nozzle Flows	Dr. Daniel W. Yannitell
152	Chemical Kinetics of High Temperature Air for Mach 5 - 14 Flight	Dr. Tsun-wai G. Yip
153	Physiological Correlates of Behavioral Performance on the Mathematical Processing Subtest of the CTS Battery	Dr. Robert L. Yolton
154	Application of Finite Element Analysis to Two Disparate Structural Problems: Thermomechanical Coupling and Optimal Sizing of Truss Members	Dr. Richard W. Young
155	(M,N)-Approximation: A System Simplification Method	Dr. Amjal Yousuff
156	The Compound Eye: An Introduction to the Variety of Visual Capabilities, Goals, and Approaches Found in the Class Insecta	Dr. David D. Zeigler
157	Microwave Impedance Matching for Optical Devices	Dr. Henry Zmuda
158	Evaluation and Analysis of VHSIC Software Tools	Dr. George W. Zobrist

APPENDIX III B

ABSTRACTS

Weather Forecast Evaluation by Decomposition of the Wind Field into Rotational and Divergent Components

by

Dr. Jon E. Ahlquist

ABSTRACT

One aspect of the accuracy of computer-based weather forecasts was investigated by preparing computer programs to separate the wind field into its rotational and divergent components and to compute the kinetic energies thereof. The programs were applied to two 4-day forecasts, one during Northern Hemisphere winter and the other during Northern Hemisphere summer.

The forecasted divergent wind field shows strong differences from the verification divergent wind field. The forecasted divergent wind is weaker and varies more smoothly in space than the verification. This suggests the desirability of checking the value of the model's damping coefficients to see whether they are set optimally.

Specification of a Vision Based

Navigation System for a Mobile Robot

by

Rashpal S. Ahluwalia

ABSTRACT

Use of machine vision for the navigation of a mobile robot was studied. An approach to determining robot position based on a visual reference pattern was developed. Software to generate motion commands and to compute the absolute position and direction of the robot was implemented. Because of the time and equipment limitations, certain task simplification assumptions were made. These assumptions need to be relaxed before the development of a prototype system.

An EPR Study of the Intermediate Radicals Produced in the Catalyzed and Uncatalyzed Thermal Decomposition of Dinitrotoluenes

by

David R. Anderson

ABSTRACT

EPR spectra were obtained of the radical intermediates produced in the thermal decomposition of 2,4- and 2,6-dinitrotoluene in the presence of hexamethylbenzene. The identities of the radicals were confirmed by spectra simulation using known or estimated hyperfine coupling terms, and these radicals are compared to those from similar reactions of TNT. The results of this work provide additional confirmation of the proposed mechanism of TNT decomposition. Catalysis by other charge-transfer agents was also investigated: hexachlorobenzene and triphenylamine seemed to inhibit the reaction, tribromobenzene and tribromoaniline increased the rate of reaction slightly, and diphenylamine strongly accelerated the decomposition but resulted in radicals completely different from those observed in neat or hexamethylbenzene-catalyzed reactions. These results cast some doubt on the mechanism of catalysis being solely charge-transfer in nature, and recommendations are made herein regarding further work in this area. A new computer interface for the EPR was also developed this summer, utilizing an IBM PC AT and the ASYST programming language. Compared to the MINC system used previously, this new system offers greatly enhanced data acquisition, analysis, simulation, storage, and hardcopy functions.

An EPR and HPLC Study of the Mechanisms and Kinetics of TNT with Various Reagents

by

David M. Barnhart

ABSTRACT

The rates of thermal decomposition of 2,4,6-trinitrotoluene (TNT) were studied via electron paramagnetic resonance (EPR) spectroscopy at 235° C while various compounds were added in a 1:9 weight ratio. The production of free radical signals was monitored to compare with previous experiments run on TNT neat. Various results were obtained showing that some additives produce different rates and in one case a different radical signal. Preliminary high pressure liquid chromatography (HPLC) experiments were conducted to study the loss of TNT and compare with the EPR results.

Atmospheric Turbulence Effects

On Optical Beams

by

Frank P. Battles

ABSTRACT

Data for C_n^2, the refractive index structure constant, in the approximate altitude range of 2-17 KM was obtained at Pennsylvania State University for the evenings of April 30 - May 6, 1986 using a stellar scintillometer. Using this data and modeling the effects of the atmosphere above and below the measured altitude ranges we have calculated values for the isoplanatic angle θ_o, and the transverse coherence length r_o. We have looked at the effects of changes in the input parameters of this model and conclude that it should give reasonable values for θ_o but not r_o. A program to calculate θ_o has been written which will allow for complete on-site reduction of data for future use. Numerous other measurements, direct and indirect, were made of θ_o during this time period. Comparisons have not yet been made.

Some Issues in the Modeling and Control of

Large Flexible Space Structures

by

Georges A.R. Becus

Abstract

The problem of selecting state and control weighting matrices in a linear quadratic regulator design so as to achieve a desired closed loop pole placement is considered. A solution using numerical optimization is proposed.

A review of available literature on the modeling and control of distributed parameter systems with special emphasis on large flexible space structures is presented.

Unresolved questions pertaining to both areas are identified and directions for possible solutions are provided, together with an indication on how these two areas could be integrated in a joint control-structural design.

FRESNEL DRAG UNIT AND REGISTRATION OPTICS

FOR THE RING LASER GYRO

by

Rex Berney

ABSTRACT

The Fresnel Drag Unit, or bias disk, is a key part of the ring laser gyro being developed at the Ring Laser Gyro Laboratory. This optical device induces an apparent rotation into the ring laser. A scheme for centering this optical device using computer controlled positioners and the ring laser output was devised. The test mirror registration system, previously developed, was modified due to changes in the ring laser experimental setup.

Corrugated Waveguides for Slow Waves

by

Albert Wayne Biggs

ABSTRACT

Properties of electromagnetic waves in slow wave structures, where the phase velocity is much less than the velocity of light, were studied. The slow wave structures consisted of rectangular serrations or corrugations with a square wave profile. Boundary conditions were obtained for slow wave structures with teeth and slots of variable widths (b-d) and b, respectively. The slot depths were also varying, so that the effects of transitions from slow to fast wave structures could be simulated. Fields in the region above the surface of the slow wave structure and in the slot regions were expanded in convenient Fourier series and these series joined at the boundaries of both regions.

The results of this study will be integrated with magnetron-type (M-type) traveling wave tubes and magnetically insulated transmission lines (MITL) in coupling from slow wave structures into fast wave structures for more efficient radiation. The corrugated MITL generates pulsed microwave power in a slow wave structure. A cylindrical horn antenna for radiating this pulsed microwave power is a fast wave structure. This study will provide an excellent model, not previously available, for subsequent analyses and experimental measurements.

Work Capacity Increased in High Ambient Temperature Chemical Warfare Environments Through Use of Intermittent Work and Individual Liquid Cooling

by

Phillip A. Bishop

ABSTRACT

It has been previously established that the amount of work performed by workers performing physical labor in hot ambient temperatures while wearing chemical defense protective ensemble (CDE) was limited by the thermal burden of this clothing. A preliminary case study consisting of nine experiments was conducted to assess the extent to which work capacity might be increased by employing an intermittent work-rest cycle combined with individual liquid cooling supplied to the upper torso during rest. The subject was a heat acclimatized 38 year old male, with a VO2 max of 4.16 l/min., weighing 84.5 kg and 184 cm tall. Effective work capacity while wearing CDE was limited to less than 85 minutes (total time to fatigue < 145 min) of intermittent 30 minute work bouts at a rate of 480 kcal/hr, with each work bout followed by 30 minutes of rest without supplemental cooling in an environmental chamber at 38/24/44 C (dry, wet and globe temperatures). Work was limited by

FACTORS IMPACTING ADAPTATION OF DECISION SUPPORT SYSTEMS: AN INTERDISCIPLINARY APPROACH

by

Patricia Thomas Boggs

ABSTRACT

In the design and implementation of computerized tools developed to enhance decision making, there are an overwhelming number of characteristics of the decisionmaker and the decisionmaking process which need to be explicitly considered. Discussions and theoretical models of these characteristics are found in the literature of psychology, MIS, organizational behavior and management science. The purpose of this study is to identify characteristics of the decision maker that may have an impact on the design of adaptive computer tools that would enhance decision making. Previous studies are discussed and suggestions for future research are discussed.

American Ballistic Missile Defense, 1955-1979

by

James A. Brown

ABSTRACT

A six-part paper on American ballistic missile defense was researched, written, and documented. The first section traces ballistic missile defense from the Nike-Zeus system of the mid-1950s through the development of the Sentinel antiballistic (ABM) system of the early 1960s. This is followed by a description of the Safeguard ABM system as it developed in the late 1960s. The third section traces the abandonment of this same Safeguard system by 1975. Ensuing sections detail the ABM Treaty of 1972 and consider the validity of the Strategic Defense Initiative in the context of the historical background. A final section focuses on the implications of SALT II for the Strategic Defense Initiative and current nuclear missile defense.

Data Management Within the School of Aerospace Medicine

by

Clifford G. Burgess, Ph.D.

Abstract

The report details an investigation of human/computer interaction within the USAF School of Aerospace Medicine (USAFSAM). Via interviews and observation, the researcher gained an insight into user perceptions of the acceptability and unacceptability of different computer interfaces. It was discovered that the preferred interface is directly affecting the future data resources of the School in that much of the data currently being collected is not being saved for future research. At the present time, a large amount of School data is being collected on microcomputers, as the interfaces provided by these machines are easier, more responsive and more flexible than those of the minicomputers and mainframe computers. Unfortunately, long-term data storage with microcomputers is not easy and requires some measure of organization and discipline. This has not been perceived previously as a problem, given the difficulty of storage and the lack of motivation, the majority of data collected on the microcomputers is not archived in any way; thus, in the long term, it is lost to the School. Hardware and software suggestions were made which could provide enhanced interfaces, while at the same time facilitating long-term data storage. In particular, a local area network was suggested within each division and specific suggestions were made for software to control data collection and validation and to ease retrieval of data from databases.

Measuring Production Rate in Aircraft Repricing Models

by

Jeffrey D. Camm

ABSTRACT

One problem of interest in the Department of Defense involves predicting the price of an annual procurement lot of aircraft given limited amounts of accounting data. One popular method for predicting lot price is to use regression analysis with some measure of cost as the dependent variable and cumulative production and production rate as independent variables. We show how measurement error in the independent variables can lead to widely varying parameter estimates, and hence widely varying predictions. The source of the problem relates to forcing a model that was designed for unit data onto lot data. An approximate method for measuring production rate is constructed, and it is used to demonstrate the magnitude of the measurement error. Finally, a more realistic formulation to the production rate measurement problem is presented, and a strategy for implementation is discussed.

This is a short version of a comprehensive report. The complete report is available from the author on request.

A Comparative Study and Evaluation of Four Atmospheric Dispersion Models with Present or Potential Utility in Air Force Operations

by

Thomas A. Carney and Michael M. Lukes

ABSTRACT

Four models of atmospheric dispersal that might be used for toxic or hazardous chemicals were evaluated and compared to experimental data. The models were evaluated with respect to potential and desirability for use in Air Force applications considering such factors as theoretical foundation, validation history and accessibility of results.

For most general applications, the AFGL AFTOX model is favored; however, the current lack of a module for simulating the behavior of a heavier-than-air-gas (HTAG) in AFTOX favors the use of Radian's CHARM in HTAG situations if limited flexibility in the output format is acceptable.

The models designed for instantaneous or explosive releases, PUFF and TRPUF, are very similar and produce substantially equal results with minimum effort when comparable input specifications are used.

The comparison of these models to two measured releases was used to highlight model features and develop understanding of model operations. The overall performance of the models against the measured data was comparable to previous comparisons and, in general, the model predictions were reasonable and consistent; the few exceptions are noted.

TURBULENT FLOW OVER AN EMBEDDED, RECTANGULAR CAVITY

by

George D. Catalano

ABSTRACT

A numerical, discrete vortex model is developed for flow over an embedded rectangular cavity, with the separation of the shear layer at the leading edge replaced by periodic insertion of point vortices. The results of the vortex model are compared to the data obtained from an experimental investigation carried out at a free stream speed of 6 m/sec past a rectangular cavity of depth, D equal to 5 cm; a depth-to-width ratio, D/W equal to 1.0 and length-to-depth ratio, L/D, equal to 4.0. The Reynolds numbers based on the cavity depth is approximately 2×10^4. Mean velocity, and turbulent intensity, profiles are presented. Evidence of the three dimensional nature of the flow has been obtained via oil film and tuft flow visualization techniques. Discrepancies between the model predictions and the experimental results are discussed as are differences between the 3-D flow field examined here and previous infinite span, 2-D, cavity configurations. Additionally, a mechanism is developed for the inclusion in the vortex model of various initial separation conditions.

FAST ITERATIVE ALGORITHM FOR 2-BLOCK H^∞ OPTIMIZATION PROBLEMS

by

Bor-Chin Chang

ABSTRACT

The two-block H^∞ optimization problem arises in the optimal disturbance attenuation with control weighting, the minimization of a weighted sum involving both the sensitivity function and its complement, and any control problems with more controlled outputs than control inputs. In this optimization problem, the most computationally demanding work is the computation of the optimal H^∞ norm denoted by γ_o. The problem of computing γ_o can be considered as that of finding a γ such that $\mu(\gamma)$ equals to 1. Some new properties of $\mu(\gamma)$ are revealed and studied. Based on these properties and those found by Chu and Doyle, and Wang and Pearson, a very fast search scheme for finding γ_o is proposed.

Effects of Unchanging Clutter on Peripherally-Precued Covert Attention Shifts

by

GARVIN CHASTAIN

ABSTRACT

The effects of the presence of unchanging clutter on covert shifts of attention to a precued target location in the visual field were studied. The delay between the appearance of the precue and the target was varied within each block. Blocked conditions included clutter density, the similarity between the shape of the clutter characters and that of the targets, and whether a clutter character appeared in each path between fixation and the target locations. Only delay had a significant effect, with shorter delays producing poorer target identification. Further research is needed to determine whether the abrupt onset of the clutter with the target is necessary for the clutter to attract attention and thereby impair performance.

THERMO-MECHANICAL BEHAVIOR OF HIGH TEMPERATURE COMPOSITES: A REVIEW

by

Shive K. Chaturvedi

ABSTRACT

A literature search was made to provide the state-of-art in modeling the strength, failure and toughening behavior of the metal-matrix, ceramic-matrix and carbon-carbon composite systems. It appears that the efforts are concentrated more towards searching appropriate fiber-matrix systems and processing techniques that can provide stronger, stiffer and more stable materials in high temperature range. However, the fabrication or processing induced failure modes such as matrix cracking, fiber-matrix interface debonding, void formation and delamination caused primarily due to large matrix shrinkage, chemical reactivity at the fiber-matrix interface under sustained or cyclic thermal loading are some of the key issues awaiting thorough experimental and analytical understanding. Some controversies in modeling various toughening mechanisms especially in ceramic composites have also been noted. Toughening mechanisms associated with crack branching and frictional load transfer between the fibers and matrix are still the open problems. In conclusion, the analytical work published in the open literature is almost insignificant to provide us any realistic predictive capabilities towards fracture, failure, crack-growth resistance, creep, fatigue, thermal degradation and stress-strain response under various thermo-mechanical loading situations at sustained high temperature.

Structure of Jet Diffusion Flames

by

Lea D. Chen

ABSTRACT

A two-dimensional visualization technique in conjunction with a reactive scheme was used in documenting and studying the structure of jet diffusion flames. Three axisymmetric burners (10 mm contoured nozzle, 11 mm long tube, and 22.5 mm long tube) and three fuels (methane, ethylene, and propane) were employed and test conditions included stabilized and lifted flames covering burner exit Reynolds number in the range of 60 to 24,000. The burner was installed in a vertical combustion tunnel with low annulus air flows. It was found that there exist two distinct vortical structures in the jet diffusion flames studied. Large toroidal vortices outside the luminous flame occurring at a frequency of 10 to 20 Hz are believed to be responsible for the well known flame flickering which has a similar frequency as the toroidal vortices. The characteristics (frequency, size and convective velocity) of these vortices are reletively insensitive to fuel type, burner geometry, and burner exit velocity. Inside the visible flame, there exist smaller roll-up vortices occurring at a much higher frequency. The characteristics of these vortices are strongly dependent on the burner exit velocity (both magnitude and profile), turbulence fluctuation, and fuel density (only important for low Reynolds number conditions). The vortices inside the visible flame are responsible for the forming of laminar flamelets in turbulent flames and the lifting mechanism. It is believed that this is the first time laminar flamelets have been physically identified and the lifting mechanism in jet diffusion flames clearly visualized. Local quenching of the flame sheet in the vicinity of burner exit is responsible for the lifting of diffusion flames. Quenching occurs through the action of pairing or merging processes of vortices inside the luminous flame. It is also found that buoyancy exerts important influence on structure of vortices inside, and possibly outside, the luminous flame.

SERUM PHOSPHOLIPID AND CHOLESTEROL ESTER FATTY ACIDS AS RISK PREDICTORS FOR CORONARY ARTERY DISEASE

BY

HOFFMAN H. CHEN

ABSTRACT

In order to improve the method for predicting heart disease, an analytical method was developed for the analysis of phospholipid (PL) and cholesterol ester (CE) fatty acids in individual lipoprotein fractions. The method consists of five fundamental steps: extraction, separation by thin layer chromatography, hydrolysis, derivatization, and quantitation by gas chromatography. Two novel internal standards, diheptadecanyl phosphatidylcholine and cholesterol heptadecanoate, were used for the PL and CE analysis. The analysis of PL and CE fatty acids in high and low density lipoproteins was performed on ten patients with coronary artery disease (CAD) and in ten patients without CAD. The distribution of PL and CE fatty acids were reported on both a quantitative basis and on a molar percentage basis. The coefficient of variation of both PL and CE fatty acid methyl esters was quite satisfactory. This analytical method employed novel internal standard for the accurate quantitation of both PL and CE in individual lipoproteins. In addition, the method will improve the specificity and sensitivity for the prediction of CAD in Air Force flying personnel because the method is quantitative as well as qualitative in that individual fatty acids are analyzed.

A Laser Study of Sulfur Hexafluoride

by

Wu Chieh Cheng

ABSTRACT

Laser-induced fluorescence spectra of sulfur hexafluoride were obtained and studied when the wavelengths of the incident laser beams were 1064 nm, 532 nm, 355 nm, and 266 nm. Additional work will be needed at other wavelengths of the incident laser beams. A kinetic study in the ionization of SF_6 and in the formation of the fluorescence spectra of SF_6 was also made.

It was found that the following processes were involved:

(1) SF_6(ground X state) + nhv $\longrightarrow$ SF_6(excited Y_3 state)

(2) SF_6(excited Y_3 state) + nhv $\longrightarrow$ SF_6^+ ions + electrons

(3) SF_6^+ ions $\longrightarrow$ SF_5^+ ions + F(3p)

(4) F(3p) $\longrightarrow$ F(3s) + fluorescence

(5) SF_6(excited Y_3 state) $\longrightarrow$ SF_6(excited Y_2 state) + fluorescence

(6) SF_6(excited Y_2 state) $\longrightarrow$ SF_6(excited Y_1 state) + fluorescence

(7) SF_6(excited Y_1 state) $\longrightarrow$ SF_6(ground X state) + fluorescence

A PRELIMINARY STUDY OF THE CHARACTERISTICS OF VARIOUS DIGITAL SIGNAL PROCESSING TECHNIQUES IN RECEIVERS

by

JOHN Y. CHEUNG

ABSTRACT

In this report, we want to examine various digital signal processing techniques that may be applicable for the receiver application. The primary emphasis of this work is directed to processing short sequences of time samples for the purpose of detecting and estimating narrowband frequencies. Current digital techniques can be divided into three main groups: direct frequency estimation methods, power spectral density based methods, and eigenvalue based methods. The first two categories of methods are examined in terms of their abilities to detect narrowband signals in noise for short sequences. In general, the direct frequency estimation methods are simple to apply, but require, when obtaining the solution, the roots of a high order polynomial. The power spectral density based methods are indirect methods and require, in general, more computations. These methods are designed for estimation of both narrowband and broadband signals. The last category is eigenvalue based methods, which are specifically designed for harmonic decomposition; i.e., frequency detection and estimation applications. A detail comparison of ten of these methods are presented in the report.

An FTIR Study of the Isomerization of Isoimides

by

Derald Chriss

ABSTRACT

A Fourier Transform Infrared (FTIR) study has been undertaken in an effort to obtain additional information about the chemistry (mechanism) involved in the formation of polyimides. The polyimides synthesized were obtained by first forming the amic acid precursor followed by formation of the isoimide, then heating to form the imide.

Results indicate that FTIR can be readily used to determine the extent to which imidization has occured. I.R. analysis is also a quick and convenient way to determine, in a semiquantitative manner, the amounts of polyamic acids, polyimides, polyisoimide, and solvent within a molecular composite.

MULTIPHOTON IONIZATION AND INFRARED GENERATION IN A CESIUM HEAT PIPE OVEN

by

Dr. Wolfgang Christian

ABSTRACT

An alkali metal vapor heat pipe oven was constructed in order to perform spectroscopic studies of Cesium atoms and in order to determine the feasibility of using stimulated electronic Raman scattering for the generation of infrared radiation. Infrared generation and multiphoton ionization were observed following excitation using a high power Nd:YAG pumped dye laser tuned near the two photon resonances of the high Rydberg D and S states . The ionization signal was primarily three photon ionization with an enhancement at the two photon resonances while infrared emission was often due to the population inversion between the high and low lying Rydberg stated produced by the pump laser. The exact mechanism for the atomic excitation when the pump laser is tuned close to but not coincident with two photon transitions is unclear but may be due to hyper-stimulated electron Raman scattering or N wave mixing and deserves further study.

A NUMERICAL SIMULATION OF THE LIQUID-METAL DUAL-LATENT HEAT PACKED BED THERMAL ENERGY STORAGE SYSTEM

by

Jacob N. Chung

Abstract

A numerical model was developed to simulate the heat transfer phenomena in a dual-latent heat packed bed thermal storage system. In the model finite difference schemes are applied to integrate the partial differential equations that govern the transport mechanisms in the system. A modified Alternating Direction Implicit (ADI) method was adopted to obtain the solutions.

The computer program, THERSTO, was verified for Single phase storage system by published results. Sample calculations were made for a system of Nak flowing through a packed be of 1" diameter encapsulated spheres filled with PCM of LiH. Transient temperature profiles for both sides are presented for Reynolds numbers of 100 and 500. Higher Reynolds number results in shorter time required for fully changing the bed. The size and front velocity of the melting zone and the condensation zone are also shown.

An Ultrastructural Study of Mossy Fiber Terminals Isolated from the Mammalian Brain

by

Brenda J. Claiborne

ABSTRACT

A preparation of mossy fiber terminals isolated from the hippocampal formation of the rat brain was characterized at the ultrastructural level. Results indicated that the fraction was composed primarily of synaptic terminals, of which at least 31% contained zinc and were therefore terminals of the mossy fibers or their collaterals. All of the morphologically identifiable mossy fiber terminals contained zinc, showing that zinc is retained in the terminals during the isolation procedure. In addition, ultrastructural examination of the other fractions generated during the isolation procedure showed that each fraction was composed of the expected subcellular organelles.

EVALUATION AND CALIBRATION

OF THE

AFGL ULTRAVIOLET IMAGING SYSTEM

by

Donald F. Collins

ABSTRACT

The spectral sensitivity of the AFGL Ultraviolet Imaging System was measured by illuminating the system for each of 4 filters with collimated monochromatic radiation of varying wavelengths and digitizing the TV-compatible images. Spatial resolution measurements were also made. The system response vs. exposure time is definitely non-linear. A model of phosphor persistence on the intensifier was developed as a possible explanation for the non-linear response.

A DISPERSION-CORRECTED HPLC/FACP METHOD FOR MEASURING SORPTION ISOTHERMS OF SUBSTITUTED AROMATICS ON SOIL ORGANIC MATTER

by

William T. Cooper

ABSTRACT

A High Performance Liquid Chromatography (HPLC) method was developed in order to study the sorption of substituted aromatics on various fractions of soil organic matter (SOM). Isotherms were calculated from the desorption branch of a single breakthrough curve *via* the Frontal Analysis by Characteristic Point (FACP) technique. Using nonretained solutes, a dispersion correction was incorporated into the calculations and the resulting dispersion-corrected HPLC/FACP method was shown to produce isotherms similar to those generated by the conventional Frontal Analysis (FA) method. The FACP technique, however, greatly reduces analysis times.

Sorption isotherms of a number of substituted aromatic compounds, each representing a different type of specific solute polarity, were determined on several SOM fractions. The resulting K_d values indicate that each SOM fraction possesses a unique set of active sites. These results imply that the sorption of relatively polar organic compounds cannot be adequately explained by the hydrophobic model, and suggest a series of experiments to determine at what level of solute water solubility the hydrophobic model needs revision.

A Study Designed to Enhance the Predictive Validity of the Two-Hand Coordination and Complex Coordination Psychomotor Tests.

By

RICHARD H. COX

ABSTRACT

The reliability and predictive validity of 36 potential performance measures were studied relative to Undergraduate Pilot Training (UPT) outcome. It was found that the two psychomotor tests studied were highly reliable regardless of the performance measure used. Calculation of error and stick movement scores using all available trials were superior to using late trials in predicting UPT outcome. Calculation of the hypotenuse of X, Y error and/or stick movement does not significantly improve the basic five-score prediction model. Regression equations for two, five and 12 variable models were calculated and presented.

Truth Maintenance and Learning in Knowledge-Based Systems

by

William B. Day

ABSTRACT

A very large, dynamic, knowledge-based system must maintain a changing database and learn new ways to utilize its knowledge. The card game of Bridge is used as a paradigm for synthesizing truth maintenace and learning. The learning system for Bridge proposes a top-level view of learning from experimentation. This incorporates these four modules: (1) a problem solver, which uses the Assumption-Based Truth Maintenace System, (2) a critic, which learns by analogy, (3) a generalizer, which learns from experience, and (4) a problem generator, which learns by discovering new heuristics.

Cloning of *Mycoplasma* Genomic Libraries in *E. Coli*

by

Vito G. DelVecchio

ABSTRACT

Genomic DNA of *Mycoplasma hominis* and *Ureaplasma urealyticum* was digested into fragments by Pst I. These restriction digests were combined with and ligated to pBR322. The recombinant DNA was used to transform HB5 *E. coli* cells. *E. coli* clones containing mycoplasmal inserts were isolated with the aid of Ampscreen, which colorimetrically assays for B-lactamase. *E. coli* cells containing inserts of mycoplasma DNA will not have B-lactamase activity, since the mycoplasma DNA is inserted into the Ap + gene which codes for this enzyme. The recombinant DNA molecules were purified from the individual clones, subjected to the action of Pst I, and electrophoresed. This allowed the sizing and isolation of the cloned mycoplasmal inserts.

A Monte Carlo Simulation of the Electron Motion in Silane and the Ambipolar Diffusion of a Multicomponent Plasma

by

Shirshak K. Dhali

ABSTRACT

The drift velocity and characteristic energy of electrons in SiH_4 were obtained by using Monte Carlo simulations. The cross section data obtained by the two-term Boltzmann approximation were used. It was found, at low E/N, that there were large differences in our calculations and the experimental values measured by Pollock [1]. The results indicate that the two-term Boltzmann approximation for evaluation of electron collision cross section is not appropriate for silane. The second study involved the spatial and temporal evolution of multicomponent oxygen plasma. Due to space-charge coupling, the ambipolar diffusion coefficient cannot be used to describe the motion of charged particles [2]-[3]. A Monte Carlo simulation was performed and the density profiles of the different ion components were obtained.

Modeling of Failure Mechanisms in Brittle Matrix High Temperature Composites

by

L. R. Dharani

ABSTRACT

A review of the existing micromechanical analytical models for predicting the failure of continuous fiber reinforced brittle matrix composites is carried out. A brief description of the observed failure modes under tensile and flexural loads is first given. The predominant modes of failure are the matrix cracking, interface debonding and fiber pullout. The initial failure in the form of matrix cracking can be predicted by using linear elastic fracture mechanics. The subsequent failure, debonding and fiber pullout, has been modeled with some approximations using energy release rates. In ceramic composites the fiber-matrix interface is weak and has been shown to be predominantly frictional. The analytical models have not addressed the frictional interface in a rigorous way. Test methods for material and structural characterization that have been evolved from those of resin matrix composites, in most cases, are not satisfactory. There is also a need to design some experimental techniques for the determination micromechanical parameters.

The Effects of Surface Roughness on Turbulent Boundary Layer Separation at Hypersonic Speeds

by

Peter J. Disimile

Abstract

In an effort to determine the current understanding of the effects of surface roughness on the separation of a fully developed turbulent boundary layer in hypersonic flows, a comprehensive literature search and review was performed. This was accomplished using the following computerized literature sources; (i) the NTIS, (ii) the Aerospace, and (iii) the NASA RECON databases. Specifically, articles cataloged with selected key words (e.g., surface roughness, turbulent boundary layer, supersonic hypersonic, etc.) were identified. In addition, the author performed a manual literature search. In total over 170 documents were reviewed.

The results of the review vividly point out the scarcity of previous research in this area. Only one document was identified that incorporated the combined effects of surface roughness, turbulent boundary layer separation and hypersonic flows.

The document, a final report by M.S. Holden[1], although preliminary in nature, demonstrated the effect of surface roughness on a slender cone and its apparent enhancement of flow separation. The fact that the only applicable document did not provide prediction techniques or insight into the degree of separation enhancement has lead to the recommendation of a new research program aimed toward filling this void.

<u>A Numerical Investigation Into the Acoustic Disturbance of a Laminar Flow Field Over an Airfoil at High Angle of Attack</u>

by

Michael L. Doria

ABSTRACT

A study was made of the effect of a time varying pressure disturbance on the separated laminar flow field over an airfoil at high angle of attack. A two-dimensional, implicit, Navier-Stokes solver was used to simulate the flow field and a sinusoidal pressure disturbance was imposed on a portion of the far field boundary. It was found that an imposed disturbance does indeed alter the lift and drag time history for the airfoil. Both the amplitude of the lift variation and the average value of the lift are affected. The effect is most pronounced when the disturbance frequency is close to the natural frequency for vortex shedding from the airfoil. Several recommendations are made for future work on the problem.

COMPUTER AIDED ENGINEERING TECHNIQUES IN AIRCRAFT LANDING GEAR ANALYSIS

by

George R. Doyle, Jr.

ABSTRACT

The Mechanical Branch, Vehicle Equipment Division of the Flight Dynamics Laboratory is responsible for performance assessment of and modification to Air Force landing gears. The ability to perform this mission, in terms of computer simulations, was reviewed. Although the Mechanical Branch is well aware of the physical phenomena associated with landing gear modeling, there are no structured, verified, documented, and efficient computer programs available to them to use in conjunction with their test facilities or to pursue development or modification of gears. It is suggested that the computer techniques be developed in the areas of strut performance, planar tire modeling, linearized shimmy, and finite element modeling of tires/wheels. Also, the thermodynamic mixing process that occurs at the gear/oil interface in a strut should be investigated analytically.

STRUCTURAL MODIFICATIONS TO ENHANCE THE ACTIVE CONTROL OF AEROELASTIC INSTABILITIES

by

Franklin E. Eastep

This study provides a method of active control of an aeroservoelastic system by the simultaneous and integrated structure and control design to increase the speed at which an aeroelastic instability occurs. A simplified aeroservoelastic system called a "typical section" is selected and the uncontrolled flutter speed of a nominal structure is calculated. A control scheme used with the nominal structure is used to increase the flutter speed beyond that without control. The structure is then modified in a manner such that the controlled flutter speed with the gains established by the nominal structure results in a further increase in flutter speed. Finally, the control gains associated with controlled flutter speed of the modified structure are varied to yield a further increase in the flutter speed. Recommendations are made to ensure that the structure and control designs are obtained in an optimal manner.

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FINAL REPORT

Laser-Induced Breakdown of Sulfurhexafluoride

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Contract No:	F49620-85-C-0013

CARBON RESIDUE STUDIES WITH A MICROCARBON RESIDUE TESTER

by

Dennis R. Flentge

ABSTRACT

A commercial microcarbon residue tester (MCRT) was used to measure the amount of carbon residue generated from ester-based lubricants with viscosities of 4 and 7.5 cSt and from the polyphenyl ethers 5P4E, 5P4E with an antioxidant additive, 4P3E and 3P2E. All of the lubricants showed significant volatilization at all temperatures with the polyphenyl ethers generally leaving residues which were less than 10 weight percent of the initial sample. An analysis of the weight percent residue as a function of location of the samples within the MCRT oven showed that a minimum of 6 sample vials distributed in either even or odd locations is needed to give reliable quantities of residue.

SYMBOLIC PROCESSING IN AUTOMATIC TARGET RECOGNITION

by

Mark A. Fulk

ABSTRACT

In order to permit investigation of the applicability of techniques from Artificial Intelligence to the automatic target recognition problem, an image processing environment was constructed in LISP. An existing algorithm due to Hamadani was implemented in this environment. A LISP workstation on loan from the vendor was examined; it was seen to offer great productivity improvements. The problem of connecting the LISP machine to existing image processing equipment was seen to be a major impediment to its use. In general, the "interface problem", that is, the problem of connecting artificial intelligence tools to image processing equipment was seen to be a major difficulty in the application of those tools to automatic target recognition. Further research investigating the applicability of artificial intelligence tools to the target recognition problem is recommended, as is further work on the problem of interfacing symbolic and image processing equipment.

RESPONSE OF DOWNSLOPE AND FLORIDA MESOSCALE WIND SYSTEMS TO PHYSIOGRAPHIC FEATURES

by

Patrick T. Gannon, Sr.

ABSTRACT

The evolution of nocturnal downslope wind systems in complex terrain was studied using a sophisticated numerical model. A separate study concentrated on the patterning of soil moisture and convective clouds over south Florida. Variations in initial soil moisture and temperature profiles led to significant changes in model-predicted circulation patterns for downslope wind systems. In Florida, when the primary forcing mechanism is differential surface heating, nascent meso-convective cloud systems are closely linked to the soil moisture field. It is concluded that surface conditions must be considered for realistic numerical simulations and ultimately, forecasting. Model runs should be conducted to determine how the addition of vegetation canopy parameters affects downslope flows and other mesoscale processes. Simpler soil layer formulations should be tested.

Theoretical Studies in:

I. Development of a Model for Tribological Studies

II. Modes of Decomposition of Stabilized Explosives

by

John K. George

ABSTRACT

Preliminary studies were done toward development of a theoretical model to permit studies of surface-lubricant interactions involving representative amounts of materials which would yield chemical information susceptible to experimental test. "Capped bond" clusters of from 6 to 54 carbon atoms for graphite and from 13 to 57 carbon atoms for diamond were prepared for semiempirical study, where the bonds into the bulk material are special capped bonds which mimic the environment of the bonding atom.

A model compound, 2-amino-1-nitroethene, was used for an ab initio study of the mechanism of decomposition of stabilized explosives. Optimized geometries using 3-21G* wave functions were obtained for several channels of decomposition. Comparison with the results of a semiempirical AM1 study revealed substantial qualitative agreement between the methods, but with important quantitative differences, especially in bond lengths (which ranged up to 8%), in bond angles in nonradical species, and in charge distribution at the amino nitrogen.

The Electron Number Density of a Plasma Derived from Measurements of Radar Cross-Sections

by

A. C. Giere

Abstract

A method is presented for calculating the electron number density of a plasma using measured radar cross-sections. The method employs the complex dielectric constant of magnetoionic theory and requires a knowledge of the power reflection coefficient of a radar signal incident on the plasma (which coefficient is related to the radar cross-section). A semi-infinite plasma is assumed as model, and formulas are derived for the plasma frequency and, hence, the electron number density as a function of the power reflection coefficient and plasma collision frequency. The results are applied to boresight error measurements with 94 and 35 GHz radar systems during tests in Range/Track G.

Text Linguistics and the Assessment of Military Rhetoric

by

Doris O. Ginn

Abstract

Many technical papers are required during the routine duties of military and civilian personnel. The one most frequently requested is the Statement of Work (SOW). The perfected development of this performance task paper is difficult for the composer and even more difficult for the reader. Both cite problems of vagueness and ambiguity. For the writer, there is difficulty in understanding the instructional demands and the practical "Know-How" of preparing the SOW; for the reader/contractor there is difficulty in comprehending what the writer has written. This report represents the research activities used to ascertain background information on the chronic issue and the methods used to collect relevant data for further study.

Chemical Defense Detection Devices

by

Thomas A. Gosink

ABSTRACT

Analytical systems for both simulant and bonefide nerve agents were investigated. A gas chromatograph with a flame ionization detector, coupled with a commercially available thermal desorber of pencil-size solid sorbent traps was set up, calibrated, and operated in comparison with the standard fluorescence method. The results show that thermal desorption-gas chromatographic analysis or the fluorescence method can account for nearly 65% of the methyl salicylate simulant in the test facility at or above the 95% efficiency level. The gas chromatographic method, however can be used for personal monitoring, and for long term time averages.

A different gas chromatograph, equipped with a phosphorus flame photometric detector, was equipped with a column useful for either a simulant (triethyl phosphate), nerve agents, or a compound closely related to nerve agents, (diisopropyl fluorophosphate). The detection limits are 2 and 8 X 10^{-12} g. of the organophosphorus compounds respectively. Thus the system could be operated in the field using 10 cc of air to provide quantitative data within 3-5 minutes. A continuous monitor based on photometric detection was also investigated as well as experiments on coated wave guides.

Structured Techniques For IMIS (Integrated Maintenance Information Systems) Software Development

By

Raghava Gowda

ABSTRACT

All the reports related to CMAS (Computer-based Maintenance Aid System), PCMAS (Portable Computer-based Maintenance System) and IMIS were reviewed. Some of the requirements of maintenance technicians were represented using structured techniques such as Data Flow Diagrams (DFD) and Nassi-Shneiderman charts. It was evident that structured techniques can be used very effectively in the various phases of IMIS development. The rationale for using structured methodologies/techniques is discussed. The use of ADA as a programming language in IMIS and other applications is emphasized. It is reccommended that the Human Resources Laboratory should decide on a set of structured techniques to be used in the software development and train the analysts/programmers working in the laboratory with the structured tools and ADA. The statement of work for IMIS software should specify the approach for documenting various phases of IMIS software development and the structured techniques to be used. The Human Resources Laboratory has recently acquired a DFD Software on the recommendation of the researcher. Familiarization with the DFD may be very useful for project managers and analysts. It will be the starting point for using Structured Techniques in HRL projects.

Multiple Processor System Design for AI-Based Process Control

by

Gerald R. Graves

ABSTRACT

The objectives and results of research concerned with multiple processor system design for AI-based process control are discussed. The potential functions to be performed by the system are identified and presented in modular fashion. These functions are discussed in relation to the sensor fusion project. The requirements and nature of communications external to the process control system are discussed. Additional effort is recommended to clearly define the functions to be performed by the system. The use of the prototype for further research concerning AI-based process control is proposed. Lastly, use of the expert system for computer communications research is recommended.

Wannier Excitons in GaAs-$Ga_{1-x}Al_xAs$ Heterostructures: Magnetic Field Parallel to the Interfaces

by

Ronald L. Greene

ABSTRACT

Using a variational wave function made up of a product of electron and hole square-well solutions and a series of Gaussians in x, y, and z coordinates, we have calculated the binding energy and diamagnetic shift of the Wannier exciton in a GaAs-$Ga_{1-x}Al_xAs$ quantum well. We have performed calculations for a variety of well sizes and magnetic field strengths with the magnetic field applied parallel to the interfaces between the two semiconductors. Comparison with measured diamagnetic shifts reveals that the theory explains the qualitative behavior of experiment. Quantitatively, the theoretical results are consistently higher than experiment by a factor of 2-3 for well sizes in the range considered (100-400 A). We discuss two significant approximations that may be important in explaining the remaining discrepancy.

A Feasibility Study of Liquid Rocket Engine
Combustion Diagnostics

by

William M. Grissom

ABSTRACT

Existing non-intrusive techniques used in combustion diagnostics were surveyed and the application of each to the measuring environment in a liquid rocket engine was considered. It was realized that there were two applications for rocket engine diagnostics. The first would be a small scale combustor which would be used to measure fundamental droplet combustion parameters. Different injectors would be interchangeable on the test rig. Measurement techniques would be laser Raman scattering for spatial concentration and temperature, laser velocimetry for velocity if desired, and possibly droplet sizing, although results from the research demonstrate that droplet sizing is perhaps practical only in a special single element test rig. Raman scattering is a marginal technique in combusting gas flows, however a liquid rocket engine appears to be an ideal application for the technique. The second application is in full-scale engine testing. The only method practical for providing spatial resolution of concentrations across the exit plane of a rocket engine plume during a single engine firing would be computed tomography of infrared absorption data. This could be accomplished using a rotating stand with multiple beams. A laser source offers many advantages over a black-body, however problems with narrow linewidth must be solved. Several solutions are suggested.

A Unified Approach to the Linear Camera Calibration Problem

by

Dr. William I. Grosky and Dr. Louis A. Tamburino

Abstract

We have formulated the linear camera calibration problem and have developed several classification schemes for various sub-cases of this problem. For each sub-case, simple solutions were found which satisfy all necessary constraints. Our results improve those already in the literature with respect to simplicity, efficiency, and coverage. Much work remains to be done, however. Our classification scheme is not exhaustive, and we would like to make it so. Also, we need to test our solutions for accuracy using data from the Numerical Stereo Camera.

Measuring Production Rate in Aircraft Repricing Models

by

Thomas R. Gulledge, Jr.

ABSTRACT

One problem of interest in the Department of Defense involves predicting the price of an annual procurement lot of aircraft given limited amounts of accounting data. One popular method for predicting lot price is to use regression analysis with some measure of cost as the dependent variable and cumulative production and production rate as independent variables. We show how measurement error in the independent variables can lead to widely varying parameter estimates, and hence widely varying predictions. The source of the problem relates to forcing a model that was designed for unit data onto lot data. An approximate method for measuring production rate is constructed, and it is used to demonstrate the magnitude of the measurement error. Finally, a more realistic formulation to the production rate measurement problem is presented, and a strategy for implementation is discussed.

This is a short version of a comprehensive report. The complete report is available from the author on request.

Estimation of Relative Risk in Epidemiological Studies

by

Ramesh C. Gupta

ABSTRACT

The relative risk (risk ratio) is an important parameter in certain epidemiological studies. It is given by the ratio of the rates of attack of a certain disease between the exposed and the unexposed group. Several classical methods of finding the confidence interval of the relative risk are investigated. Since these intervals turn out to be too wide in most cases, the Bayesian estimation of the relative risk using (a) uniform [0, 1] priors (b) restricted uniform priors (c) beta priors are studied. The appropriateness of such priors is discussed in the medical setting and analytical expressions are obtained for the distributions of the risk ratio in the above three cases. Data taken from a recent clinical study are analyzed and 95% confidence limits are obtained for the three types of priors along with those of Thomas and Gart Baptista-Pike and Fleiss (Non-Bayesian). In all the cases Bayesian intervals have shorter length. Finally calculations are performed to compare the Bayes and the non-Bayes confidence intervals in terms of their lengths and the coverage probabilities.

DEVELOPMENT OF A RULE-BASED EXPERT SYSTEM FOR DAMAGE ASSESSMENT OF AIR FORCE BASE STRUCTURES

by

Fabian C. Hadipriono

ABSTRACT

The damage level of protective structures depends on damage criteria, such as, functionality, repairability, and structural integrity of the structure. In this report, the variables of these criteria are evaluated. The assessment of these variables is usually performed through subjective judgment. Therefore, their values are represented by fuzzy sets. Three questionaires concerning the above damage criteria are made for the purpose of assessing the values of these variables through expert judgments. The results will be used for developing the production rules of a knowledge-based expert system. An approach using the fuzzy set and fuzzy logic concepts is recommended for this purpose.

Simulation of the Cardiac Conduction System

by
Frank Hadlock

ABSTRACT

A synchronous discrete event simulation model was developed to simulate the wave of cardiac depolarization of the ventricular portion of the human heart. The model employs a discrete geometrical model of the heart, based on one millimeter cubical cells, and a discrete set of conduction states which the cells can assume. The eventual output of the simulation is EKG signals or body surface potentials. The model is sampled synchronously at time steps appropriate for the intended output.

A Framework of an Optimum Synthesis

Environment for the Hydrocode EPIC-2

by

Prabhat Hajela

ABSTRACT

The present study seeks to examine the efficacy of a mathematical nonlinear programming approach for the optimal synthesis of structures subjected to high strain-rate plastic deformations. Efficient methods of constraint representation are implemented to reduce the dimensionality of the optimization problem, where the latter is an outcome of the transient nature of the response functions. A Lagrangian discretized domain approach is used for the solution of the equations of motion and is coupled to a feasible usable search direction algorithm to form an optimization programming system. The optimum sizing of a projectile shell for survival in a high velocity impact, provides the test problem for this study. A stepwise linearization of the design space is attempted for computational efficiency, with encouraging results.

Modeling of Human Body Movement

by

Patrick Hannon and David Jansen

ABSTRACT

The Articulated Total Body (ATB) model is used to simulate biodynamic responses due to forces on the human body such as localized contact forces, aerodynamic drag, or internal muscular forces. Validation and possible improvement of the model was investigated through two approaches. A skilled motor performance, the overhand baseball throw was selected as the basis for the validation study, and three-dimensional experimental data from human subjects were obtained. In the first approach, muscle forces derived from the literature were input to the model for the right upper limb. The time courses for the muscle forces were obtained from electromyography studies of overarm throwing. Good statistical correspondence between the experimental data and the output from the simulation resulted. The second approach involved prescribing the motion of a single joint (the right knuckle) and adjusting other parameters of the ATB model to obtain correspondence with the experimental data. No muscular forces were involved in this approach. Significant statistical correspondence resulted, though not as high as with the first approach. Recommendations for further validation and development of the ATB model were made.

FIELDS OF A SLOT ANTENNA ON A HALF-SPACE FED BY COPLANAR WAVEGUIDE USING THE METHOD OF MOMENTS

by

Donald F. Hanson

ABSTRACT

This report describes the results of my summer's work at Hanscom AFB with Dr. Robert J. Mailloux's group, RADC/EEA. There is a need to determine the quality of a slot antenna system when the antenna is fed by coplanar waveguide. Therefore, the objective of the work is to model a coplanar waveguide-fed slot antenna. The method of moments is used to obtain numerical results for this problem.

First, an integral equation for the problem is derived. Next, the method of moments is applied to the integral equation, resulting in a 1643 line program SLTANT. Finally, the magnetic current, the input impedance, and antenna patterns are found. Data for one case are shown.

Effect of Low Frequency Vibration on Bone Remodelling in the Rhesus Os Calcis

by

Gerald F. Harris

ABSTRACT

The naturally occurring phenomena of bone growth, modelling and remodelling were first studied through a review of current literature. This was followed by a review of recent studies of hypogravic exposure and vibration. The anatomy of the Rhesus Os Calcis was then reviewed, and a series of dissections performed to better understand the structure and load transmission characteristics. The vibration protocol used in treating the study animals was then thoroughly reviewed. Control and vibrated Os Calces were then extracted from 6 vibrated and 2 control animals. The specimens were embedded in methyl methacrylate, cut, sanded, stained, and mounted on slides. Histomorphometric data including static and dynamic remodelling parameters was obtained. Further work needs to be done in computing the stereology parameters and in completing a statistical analysis of the results.

Mental Rotation and Perspective-Taking Skills

In Pilots and Non-Pilots

by

Edward J. Haas

ABSTRACT

Spatial skills in pilots and non-pilots were compared using a traditional mental rotation task, and a new task combining mental rotation and perspective-taking. In the traditional task, subjects had to decide whether a rotated alphanumeric character appeared in its conventional version, or a mirror image of the conventional version. In the new task, subjects compared two views of a scene containing aircraft and terrain, and had to decide whether an objective, "God's eye view" (GEV) containing two aircraft depicted the same or mirror version of the scene as it would apear from the cockpit of the trailing aircraft. Different GEVs showed the same scene from various angles around and above the flight paths of the aircraft. In general, response times increased as both the alphanumeric stimuli and cockpit views were rotated away from upright. In the GEV task, response times were fastest when the perspective of the GEV was directly behind and above the cockpit view aircraft, and increased as the perspective of the GEV was increasingly to the side of and at the flight level of the cockpit view aircraft. Furthermore, the data suggested that non-pilots make mental movements in elevation and azimuth independently, whereas pilots may be able to combine both components of motion. This difference might be due to pilots' experience with three-dimensional movement and thought.

REVITALIZATION OF OPERATIONS AND CONTROLS FOR THE TURBINE ENGINE TEST CELLS AT THE ARNOLD ENGINEERING DEVELOPMENT CENTER

by

Doyle E. Hasty

ABSTRACT

The Arnold Engineering Development Center was contracted by the Air Force Systems Command to expedite and solve problems in the research, development, and testing of the nation's top priority aerospace systems. The AEDC operates the world's largest complex of aerospace flight simulation test facilities. As part of the facilities, the turbine engine test cells have received various modifications and adaptations over the last thirty years to accommodate the changing needs of technology.

The objectives of this research analysis were to specify, implement, and evaluate the new operational methods and new automated control systems to improve and modernize the turbine engine test cells. With this state-of-the-art updating that is being provided the turbine engine test cells, these test facilities will continue to be an active part of aerospace system's evaluators well into the next century.

Operation of the Electron Ion Momentum Transfer Instability Mechanism in Moderately Dense Plasmas

by

Michael A. Hayes

ABSTRACT

The physical mechanism leading to the fast growth rate collisional instability for ion acoustic waves in highly ionized plasmas was investigated. This mechanism was describable as the growth of the spatially periodic electron density perturbation which results from a spatially periodic electron velocity perturbation. The peridocity of the velocity is in turn a result of the relationship between the electron-ion collisional momentum transfer and the spatially periodic ion density perturbation associated with the ion acoustic wave. Direct calculation of the moment equations and the instability growth rate from the physics describing this mechanism gives, to within the precision of this approach, quantitative agreement with the more formal treatment of Jasperse and Basu. This work will be submitted for publication.

Experiments designed to search for the theoretically predicted were proposed, and the proposed experiments are here described. A review of electromagnetic wave-plasma scattering diagnostic literature was performed, and the relation of this literature to the experimentlal problem at hand was assessed. Experimental work on lower hybrid wave propagation was also performed, in conjunction with the Research Laboratory of Electronics at MIT, and an abstract of the results of this work is soon to be published.

Evaluation of Several High Strength Composite Conductors

by

James C. Ho

ABSTRACT

Micrographic examination was made on a recently produced composite conductor. This conductor consists of 2,989 (61x7x7) high purity aluminum filaments in an aluminum-iron-cerium alloy matrix. Deformation of the filaments, having a total of 4,096 (16x16x16) : 1 area reduction through three consecutive extrusions, appears to be well acceptable.

Another aspect of the program aims at assessing high temperature electrical resistivity of several dispersion strengthened conductors with potential applications in high current opening switches. Measurements were made on copper-niobium, copper-alumina, aluminum-silicon carbide, and aluminum-iron-cerium.

The Locally Implicit Method for Computational Aerodynamics

by

Peter Hoffman

ABSTRACT

Investigation of the locally implicit method is part of the search for a less expensive method to compute viscous flows in aerodynamics. Viscous flow calculations are subject to severe Courant Number restrictions unless implicit methods are used. However, implicit methods require structured grids, which are expensive to compute, and are impeded by the use of approximate factorization. The locally implicit method requires neither. This research investigates the Courant Number restriction on the stability of the locally implicit method and provides variations of the method which have no restriction. In 2D and 3D, this algorithm is an ideal candidate for parallel computation.

PROCEDURES FOR EFFICIENTLY EXTRACTING THE KNOWLEDGE OF EXPERTS

Robert R. Hoffman

ABSTRACT

The first step in the development of an artificial intelligence "expert system" is the extraction and characterization of the knowledge and skills of experts. This step is widely regarded as the major bottleneck in the system development process. In previous work (Hoffman, 1984) I analyzed a number of methods for extracting experts' knowledge. The present report summarizes an analysis of another method, the "unstructured interview" method. I also compare the various methods in terms of their overall efficiency at generating propositional information for a data base. I conclude with a recommmended series of steps for extracting experts' knowledge, steps that should apply to any expert system development project.

FLUORESCENT DYE BINDING ANALYSIS

FOR THE

IDENTIFICATION OF ASBESTOS

by

CLIFF HOUK

ABSTRACT

The fluorescent dye binding properties of several organic dyes for the identification of asbestos in bulk samples and on membrane filters were studied and compared to previously reported results. Five dyes, Morin, chromotropic acid, Clayton-Yellow, 8-hydroxyquinoline and Bathocuproine exhibited easily detected fluorescence on bulk samples containing chrysotile asbestos. Fluorescence microscopy data suggests that Morin and Clayton-Yellow bind to other forms of asbestos that may be found on membrane filters from personal or area sampling at work sites. These dyes do not bind to other substances commonly found in building materials.

Preliminary methods using these dyes for the analysis of bulk samples and membrane filters from personal or area air samples are presented. Extended research is necessary in both areas.

Thrust Computing System

by

Ming-Shing Hung

ABSTRACT

A new model for analyzing the TCS data set was formulated and executed. The results indicate that engines behave differently from one trim to another. They also show that the data set is unstable, highly sensitive to small changes in some data items and deletions of some items. These observations cast doubt on the ability to use the results to help set the trim, both installed, using TCS, and uninstalled, under the current procedure. Therefore, it is recommended that explanation for such engine behavior be pursued first, before the issue of whether to use TCS can be settled.

Estimation and Discrimination Procedures for a New Measure of Maintainability/Reliability

by

J. Marcus Jobe

ABSTRACT

The maintainability/reliability measure discussed in this report is referred to as MTUT. It corresponds to the average number of maintenance hours required per operating hour. This measure integrates maintenance and repair time expenditures of all types from three levels of maintenance. Other measures discussed in the literature commonly reflect just one of the following: operational readiness (availability), logistics and support burden, or system maintainability. MTUT logically incorporates the information from these three sources into a single coherent figure of merit. This report presents estimation and discrimination procedures for MTUT under various assumptions. It is assumed that all failure rates are constant throughout this report. This corresponds to interarrival times which have an exponential distribution. Large sample theory is used to construct both interval estimates and discrimination procedures for the MTUT parameter . A minor theorem stating a simple sufficient condition for the existence of a steady state availability is stated and proved. Recommendations concerning further work concludes the report.

DESIGN SYNTHESIS OF NONLINEAR SYSTEMS

by

Glen E. Johnson

ABSTRACT

The automated optimal design of reinforced concrete footings is considered. Software is described and presented for use in the design of cylindrical footings when the only significant loading is due to wind. Software is described and presented for the design of rectangular footings subjected to both bearing and wind loads. Program features are discussed and suggestions for future work are outlined. A companion report by Mr. C. R. Hammond presents the work on the development of an expert system to set up and solve problems in nonlinear optimal design.

Analysis of FPS Tracking Radar for Error Reduction and Modeling

by

Jeremy C. Jones

ABSTRACT

This report deals with the problems of understanding and reducing errors in range, azimuth and elevation of the FPS-16 precision tracking radar systems, in use at Eglin Air Force Base for detailed mission analysis. Low elevation angles involve more difficult error reduction due to a large, complex error involving multipath interference, and refraction. High refraction gradients of warm humid Gulf air mass edges, give a larger random component of refractive errors than at many of our (often desert) Air Force bases. A method is conjectured to reduce these refraction errors. Correlations between measured parameters and calibrated errors were found which permit preprocessing or real-time direct error reduction. For instance a strong correlation between range and the low frequency component of elevation error was found. Another form of correlation which was less directly useful for error reduction, but tended to give insight into FPS-16 functional parameters and performance limits, was a causal link between two or more types of error, e.g. between range error and azimuth error. Because of velocity/acceleration influence on radar errors, the first and second derivatives were considered in the analysis. Twelve technical seminars were also given on those areas thought to be most directly usable to Eglin AFB math and computer science personnel.

ORGANOPHOSPHATE INHIBITORS: REPEATED LOW DOSE EFFECTS OF DIISOPROPYLFLUROPHOSPHATE ON SEROTONIN RECEPTORS IN RAT CORTEX

BY

Betty Ruth Jones, Ph.D.

ABSTRACT

The proposed study will apply biochemical and morphological procedures to investigate repeated low dose effects of diisopropyl-fluorophosphate (DFP) on serotonin receptors in the cortical areas of rat brain. We propose to determine whether there is a reduction in the number, alteration in concentration and binding of serotonin$_1$ (S_1) or (5-HT_1) and serotonin$_2$ (S_2) or (5-HT_2) receptors following repeated low doses of DFP. The proposed study will further determine if there are morphological alterations in presynaptic and postsynaptic membranes; and innervating serotonergic fibers of the cortex of rats following DFP administration.

The methods of approach will inlcude the following: Biochemical Receptor Binding Assays, Scanning Electron Microscopy, Transmission Electron Microscopy and Fluorescent Immunohistochemistry using Light Microscopic methods. Such studies are significant in better understanding structural-functional and neurobiochemical mechanisms of serotonin receptors and drug interactions (i.e., effects of DFP on serotonin receptors).

Optimal Filtering

by

Marvin S. Keener

ABSTRACT

Two problems are studied which arise in tracking problems. The first involves the modification of a tracking filter which incorporates the missile dynamics in order to account for the delay in the commanded missile acceleration and the achieved missile acceleration. The original signal model is reformulated through state augmentation so that the standard Kalman filter applies. The second problem concerns filter stability. In particular, comparison type results are sought in order that stability of a time-varying filter may be established.

A PRELIMINARY STUDY FOR CENTRIFUGE MODEL TESTING OF SEMIHARDENED CONCRETE ARCHES

by

Yong S. Kim

ABSTRACT

The centrifuge model technique is reviewed in order to investigate the behavior of semihardened concrete arches. The centrifuge facility at the Air Force Engineering and Services Center is evaluated, and the required equipment and instrumentation for the centrifuge model study are recommended accordingly. In addition, the parameters influencing the stability of concrete arches are elaborated with a discussion for classifying them as to the design criteria.

The Synthesis of Fluorodinitroethylnitraminoalkyl Nitrates and Compatibility Studies of GAP-Nitrate and TAET

by

Joel R. Klink

ABSTRACT

A series of hydroxyalkylamines were condensed with 2-fluoro-2,2-dinitroethanol. Nitration of the resulting products with a mixture of fuming nitric and sulfuric acids yielded the nitraminoalkyl nitrates. Notably tris(hydroxymethyl)methylamine was found to undergo this reaction sequence to yield 5-fluoro-2,2-bis(hydroxymethyl)-3,5,5-trinitro-3-aza-1-pentanol trinitrate. The compatibility of glycidyl azide polymer containing nitrate end-groups (GAP-nitrate) and 2,2,2-tris(azidomethyl)ethyl 4,4,4-trinitro-n-butyrate (TAET) with typical solid propellant components was also studied. After 62 days at 63^{o}C (145^{o}F) no extensive degradation was observed as evidenced by the lack of gas evolution. Some color changes did occur, however.

RELIABILITY IN SATELLITE COMMUNICATION NETWORKS

Stephan E. Kolitz

ABSTRACT

A very important requirement of a communication network is to deliver data from a source node to a destination node. The physical layout of a communication network and the method of routing data in it are very closely related. This report looks at a class of network layouts called loop topologies and identifies reasonable measures and some algorithms that appear useful in calculating these measures. In addition, an algorithm which finds the most reliable path between nodes is presented.

INVESTIGATION OF VAPOR DEPOSITED ALUMINUM ALLOY FILMS

by

Philipp Kornreich

ABSTRACT

I originally planed to investigate electromigration in Al-Cu alloy films. I planed to fabricate these films in our Micro-Electronics facility at Syracuse University. However, when I started the project at RADC we decided to convert an old Auger apparatus to an MBE machine and use it to grow the Al-Cu alloy films. The construction of the MBE machine in the RADC machine shop left mi some spare time. I decided to deign a Spectroscopic Epitaxy (SE) machine for the Syracuse University Micro-Electronics Laboratory. I also heped out the EDRE group at RADC by investigating various metalizations on Leadless Chip Carriers (LCC). This information is used for military specifications of LCC's.

MODIFICATION OF PRIORITY HANDLING ALGORITHM IN THE INTEGRATED NODE NETWORK

BY

Mou-Liang Kung

ABSTRACT

The integrated Node Network Simulator is a software package simulating a fully connected integrated digital network implementing both circuit switching for voice and packet switching for data. A maximal bandwidth is reserved for voice and the remaining bandwidth is for data packets. However unused voice bandwidth can be taken by data packets. When voice traffic becomes excessive over a period of time, the data packet queuing also becomes excessive. Two solutions are investigated to increase the data transmission throughput at the expense of the voice. The first solution is to adjust the maximal voice bandwidth dynamically and the other is to use variable frame scheme rather than the fixed frame. The solutions further lead to the question of what constitutes the "best" priority handling algorithm to satisfy the demand under heavy voice and data traffic.

Ability, Experience and Task Characteristic Predictors of Performance

by

Charles E. Lance Ph.D.

ABSTRACT

This study investigated main effects and interactions among aptitude, job and task experience and task characteristics in predicting Jet Engine Mechanic (JEM) (AFS 426x2) task performance. Aptitude (ASVAB MEC-AI), job and task experience composites and task learning difficulty indices (LDIs) all were significant predictors of task performance. Contrary to hypotheses, task differences did not moderate relations between task performance and either aptitude or experience. However, small but statistically significant aptitude x experience interactions indicated that task performance becomes less predictable from aptitude scores over a JEM's first term of enlistment. Finally, one approach to determining aptitude requirements from indices of situational demands (LDIs) was illustrated. Future research should (a) be extended to levels of aggregation appropriate to the desired level of inference; (b) sharpen the definition and measurement of the job experience construct, (c) investigate temporal changes in performance determinants, (d) identify determinants of latent performance variables, and (e) seek to corroborate statistical models for correcting for rater biases.

Multiaperture Optical Systems and Neural Networks Capable of the Detection of Motion, Speed, Direction and Distance

by

David Lawson

Abstract

An artificial multiaperture optical system is an array of sensors. The insect eye is a natural example of the same thing. We use insect behavior as a guide to the development of neural networks capable of organizing and responding to data collected by multiaperture systems. We present networks capable of detecting motion, speed, and direction. We demonstrate that the Aperture Problem (the problem of determining the direction of large objects by local direction mechanisms alone) can be solved for a restricted class of objects. Distance presents a special problem which can be resolved by binocular vision, peering, and/or ranging. In addition, we present a neural derivative capable of detecting the motion of light edges, and an off-center version capable of detecting dark edges. Recent experiments have shown that motion detection mechanisms in the Rhesus monkey react in this manner. Neural tracking and attention mechanisms are also presented.

Paul S. T. Lee, Ph.D.

ABSTRACT

This paper developed and discussed two experimental designs: Completely Randomized Design and Factorial Experimental Designs. They were designed mainly for the purpose of achieving three objectives: (1) To have high power in testing the effects of major factors affecting aircraft transparency failure modes, (2) To be cost-effective in testing materials, and (3) To be able to make predictions using data obtained from laboratory tests.

Multiple regression, both of linear and non-linear, have been discussed along with analysis of variance for the purpose of making predictions. It has been demonstrated that little effort was needed to conduct regression analysis once the analysis of variance is completed. Empirical data were used to the extent it is possible. Recommendations were made in four areas, namely: Applications, sample size, the ability to make predictions and a planned experiments. In short, it is highly recommended that experienced statisticians be consulted in the planning stage of an experiment for his advice to gain power of testing, efficiency in testing materials and to be able to make predictions.

ION-MOLECULE REACTIONS

OF

H_2O^+/H_2O, N_2^+/CO_2, and N^+/CO_2

by

C. Randal Lishawa

ABSTRACT

We have measured the reactive cross section as a function of translational energy for the reaction $H_2O^+ + H_2O \longrightarrow H_3O^+ + OH$. By using isotopically labelled compounds, we have been able to distinquish between the proton transfer and hydrogen transfer reaction channels, as well as the the symmetric charge exchange cross section. Using the same techniques, we have measured the cross section as a function of translational energy of collisions of N^+ and N_2^+ with CO_2. We have observed the product channels CO_2^+, NO^+, and CO^+ (for N^+ only).

Study of Rutting of Asphalt Pavement under High Tire Pressure and Temperature

by

Cheng Liu

ABSTRACT

Since a new generation of heavier Model F-15 C/D aircraft has come into use, rutting of asphalt pavement under high tire pressure and temperature has become a matter of concern. A variety of factors contribute to rutting of asphalt pavements. Parameters affecting rutting of asphalt pavement were identified and their contribution to rutting were explored in this study. The Shell method of predicting the amount of rutting that would occur in an asphalt pavement was briefly discussed. A field traffic test plan designed to compare the rutting effects of the main gear of the F-4 (265 psi, 27,000 lbs) and the F-15 C/D (355 psi, 30,500 lbs) on 4-inch asphalt concrete overlaying 12-inch jointed portland cement concrete is currently underway at Tyndall AFB. Rut depth and other pertinent design properties are to be measured every 300 to 600 passes of the F-4 and F-15 C/D loadcarts.

August 15, 1986

SELECTED SPECTRAL STUDIES OF THE SUN

by

James Charles LoPresto

ABSTRACT

Selected spectral data of Fe I 3969Å, Mg I 5184Å and K I 7699Å at many spatial positions on the Sun have been obtained with a CCD camera at the Vacuum Tower Telescope at the National Solar Observatory at Sacramento Peak. This data will be combined with additonal K I 7699Å data obtained by Dr. Steven Keil in a similar fashion and with still additional data obtained by Dr. James LoPresto and Dr. Keith Pierce with a rapid scanning photoelectric detector at the McMath Telescope at the National Solar Observatory, Kitt Peak. The Fe I and Mg I data are used to measure systematic errors between the two telescopes. The combined K I 7699Å data set will be analyzed to obtain the solar rotation parameters and the gravitational red shift. This is relevant to detecting any short and long term changes in solar rotation and increasing the accuracy in measuring the solar gravitational red shift. The results of a computer analysis of this data at Edinboro University will be published in SOLAR PHYSICS .

Visual Problem-Structuring and Hemispheric Processes of the Human Brain

by

Stephen L. Loy

ABSTRACT

The possibility of the relationships between right-hemisphere brain functions in visual problem-structuring aids were explored. A theoretical model of the role of hemispheric functions in visual problem structuring is developed and recommendations for testing this model are presented. The literature and theories of hemispheric brain functions, structural modeling, computer-based decision support systems (DSS) are reviewed in the first section of this paper. A theoretical model of the role of hemispheric functions in visual structural modeling is developed in the second section. The model posits that the information processing functions of the hemispheres influence the effective use of a visual problem structuring tool in formulating complex problems.

REVIEW AND EVALUATION OF A REFUELING CAPABILITY ASSESSMENT MODEL

by

Nancy I. Lyons

ABSTRACT

A study was made to determine the necessary features required of a computer simulation model for assessing aircraft refueling capability at the base level. The RCAM model was used as a starting point. The model was tested for accuracy and validity in representing refueling operations. The assumptions, limitations, and the strong and weak points of the model were documented for future reference. The code was studied to identify computer algorithms used to schedule events and to evaluate the related system subprograms. Based on these findings a recommendation was made to retain the RCAM scheduling algorithm and as much as possible of the other parts of the model. Substantial improvements need to be made to the data entry procedures. Several modifications and additions in other areas were identified for further study and consideration. A prototype of the proposed model was prepared for possible demonstration purposes to solicit suggestions from potential users. The prototype is based on the RCAM model with improvements in the output, the addition of personnel, and the addition of a delay summary table.

STATISTICAL PATTERN RECOGNITION
MODELLING OF VISUAL PERCEPTIONS

by

Robert L. Manicke, Ph.D.

ABSTRACT

This report is divided into two main sections. The first section develops the context and deductions necessary to construct a probability distribution of perceptual stimulus spaces. The second section propounds the notion of perceptual differentiation by prescribing a probabilistic metric model to mimic the orders from a respondent's point pair comparisons.

Specifically, the first section constructs a probabilistic context for the multidimensional scaling method. This context is generated by considering human pattern recognition as a question of estimating the relative multivariate odds that input stimuli can be associated with some known cognitive populations. The last section models paired comparisons of stimuli by differences of stimulus utilities. Distances between stimuli are derived by probabilistic measurements of these utility differences.

AN EXPERIMENTAL DESIGN TO VERIFY THE AFGL FASCOD2 FOR WATER VAPOR AND CARBON DIOXIDE AT LOW TEMPERATURES AND PRESSURES

by

ARTHUR A. MASON

ABSTRACT

The AFGL FASCOD2 (Fast Atmospheric Signature Code) is a model and computer program for accelerated line by line calculation of spectral transmittance and radiance for atmospheric problems. This summer research project was devoted to designing an experiment to verify the model and programs of FASCOD2 under conditions experienced in test cell environments at altitude, that is, conditions of low temperatures and pressures. Preliminary spectral measurements were made showing satisfactory comparison. A secondary objective evolved during the research: The design and development of a high altitude spectroscopy calibration laboratory for basic infrared measurements of gases of interest to the Air Force.

The Determination of Lead in Blood

by

Curtis W. McDonald, PhD

ABSTRACT

Lead in blood is determined at USAFOEHL using an atomic absorption spectrophotometer equipped with a graphite furnace. The low melting point of lead causes its loss due to vaporization at the charring step prior to the measurement of lead. This leads to errors in the method. Ammonium phosphate has been recommended as a matrix modifier to react with lead to form high melting lead phosphate which should permit the utilization of higher charring temperatures. Ammonium phosphate did not prove to be a good matrix modifier. A theory was developed to explain the limited usefulness of ammonium phosphate. The rough surface of the graphite tube at the charring temperature (500°C to 600°C) in an enert argon gas atmosphere is an excellent reducing medium. It appears highly unlikely that the phosphate, which has a pentavalent phosphorus attached to four oxygen atoms, would be stable under such a reducing atmosphere. The lead phosphate would probably decompose to metallic lead which would instantly melt at the charring temperature and begin to vaporize causing a loss of lead.

COMPATIBILITY OF REINFORCEMENT AND MATRIX PHASES IN COMPOSITE MATERIALS FOR HIGH-TEMPERATURE, AEROSPACE APPLICATIONS

by

GOPAL M. MEHROTRA

ABSTRACT

The mutual chemical compatibility of the matrix and reinforcement materials, for ceramic-ceramic and ceramic-intermetallic composites, was analytically evaluated with the help of thermodynamic calculations. In the case of ceramic-ceramic composites, the chemical stability of TiC, AlN, TiB_2, HfC, and ZrC in a matrix of Al_2O_3, ZrO_2 or HfO_2 was evaluated. In the case of intermetallic-ceramic composites, Al_2O_3, TiC, TiB_2, SiC, Si_3N_4, and AlB_{12} were evaluated as reinforcement phases in a matrix of Ni_3Al. More work on analytical and experimental evaluations needs to be done for ceramic-ceramic composites.

In addition, experimental work was initiated to synthesize silicon hexaboride, which has been reported to have very good oxidation resistance up to $\sim$ 1530°C.[1] It was found that the reaction between the silicon and boron powders is sluggish, and that an accurate control of conditions during hot-pressing is necessary. The products of syntheses were characterized by x-ray diffraction (XRD). Further experiments to standardize the conditions for synthesis of SiB_6, and to characterize it by analytical electron microscopy, thermogravimetric analysis (TGA), and differential thermal analysis (DTA) need to be carried out.

EMPIRICAL CONFIDENCE INTERVALS FOR A VALIDITY COEFFICIENT UNDER RANGE RESTRICTION: AN APPLICATION OF THE BOOTSTRAP

by

Jorge L. Mendoza

with the assistance of

Darren E. Hart and Amy B. Powell

ABSTRACT

Efron's bootstrap procedure was utilized to develop two computer intensive techniques for constructing confidence intervals on the unrestricted correlation parameter under explicit predictor restriction. One procedure bootstrapped the corrected correlation coefficient to obtain the interval, while the other one relied on the frequency distribution of the applicant test scores to generate the bootstrap confidence interval. The techniques were evaluated using a Monte Carlo procedure. The study assessed the techniques under a number of hypothetical selection situations. The results showed that boostrapping the corrected correlation coefficient is a reliable technique for obtaining confidence intervals for the population correlation under most selection situations.

Human Factors Analysis of a Microcomputer-Based Maintenance System for Advanced Combat Aircrafts

By

Shreenivas Moorthy Ph.D., P.E.

ABSTRACT

Maintenance performed in the present way has resulted in costly losses, both in terms of wasted manpower resources and in terms of the unnecessary replacement of parts. While the combat readiness of the U.S. Air Force is a primary objective of maintenance, such a waste of resources cannot be tolerated. This report analyzes the human factor requirements of the microcomputer-based maintenance system for advanced aircrafts. The analysis is based on applying the state-of-the-art technology, application software, as well as emerging developments in microelectronics. The approach optimizes user interest compatibility with system reliability, availability and maintainability and its performance efficiency characteristics. Recommendations for a significantly improved system from the human factor point of view are highlighted. Excellent cooperation from various personnel and the organization is deeply appreciated.

Evaluation of a Computer Model to Predict Thermal Retinal Damage from LASER Radiation

by

Mary L. Morton-Gibson

ABSTRACT

A computer model of the thermal response and predicted damage to the eye from a LASER assault was examined in some detail. The basic equations and assumptions used in developing the model, the values of the constants used and the method of solution have been determined. The sources of some errors have been identified and an interim solution implemented. Recommendations are made for improving the user-friendliness and flexibility of the program, updating some of the algorithms and program parameters and developing user documentation.

A preliminary simulation indicates that retinal damage due to LASER assault is increased when retinal blood flow is decreased. Since retinal blood flow is markedly reduced during high g load accompanying some flight maneuvers, a parametric study is recommended.

CHLAMYDOMONAS PHOTOTAXIS AS A SIMPLE SYSTEM FOR TESTING THE EFFECT OF DRUGS ON VISION

by

Rex C. Moyer, Ph.D.

ABSTRACT

The major goal of this program is to develop, refine, and characterize the phototaxis system in **Chlamydomonas reinhardti** and then employ it in the goal of finding and quantifying the effect of drugs which may enhance dark or color vision in pilots. A major problem associated with the testing of drugs which may affect vision in animals or man is that the drugs may affect more than one tissue, organ, or organ system. The advantage of first testing the effect of the drugs on the ability of a phototactic alga such as **Chlamydomonas** to swim toward the light is the inherent simplicity of the system in which the investigator can control the variables. **Chlamydomonas** is a simple, single-celled alga whose phototaxis apparatus biochemically mimics the fundamental vision system of man.

Major emphasis of our research team, Ms. Angela Braun, Dr. Taboada and Dr. Moyer has been the simplification of the procedure for producing phototactic cells and improve the method for measuring phototaxis. Eight Strains of **Chlamydomonas reinhardtii** were placed under phototaxis-inducing conditions and the growth and phototactic ability of the strains compared in different phases of their growth curves. Various means of measuring phototaxis were investigated. We were successful in simplifying and shortening the procedure for developing phototactic cells and in developing a simple and rapid method for quantifying the phototactic ability of algae cells to any wavelength of light between 400 and 700 nanometers.

Because of the large amount of data generated and the size limitation of the final report, the final reports of Ms. Braun and Dr. Moyer have been cooperatively blended to provide enough space to include all of the figures and legends.

An Investigation of the Utility of Computational

Fluid Dynamics in the Prediction of

Structural Active Cooling

by
V.Dakshina Murty

ABSTRACT

The finite element method is used to analyze forced convection heat transfer problems that are of interest in the evaluation of heat exchanger effectiveness. Towards this end, the transient, incompressible Navier-Stokes equations together with the energy equation are solved using the Galerkin's variational scheme for spatial descretization and the Crank-Nicholson method for time variation. Partial results in the form of plots of isotherms and streamlines for various values of the Peclet number are presented for two problems. They are --- forced convection in a 180 degree channel and forced convection through a rectangular offset pin array.

A Model for a Coordinated System of Parallel Expert Systems for Autonomous Satellites

by

Richard W. Nau

ABSTRACT

The problem of a coordinated system of expert systems for use in achieving autonomy for satellites was studied and an appropriate model obtained. Design goals for independence, flexibility and robustness were outlined. Object oriented representations for both experts and physical systems were developed and organized into a coherent hierarchy consisting of a coordinating root node, functional groupings and individual systems. Specification of expert systems as objects, communication protocols between the systems, rules within the systems and amenability to parallelism were demonstrated.

CO_2(001) VIBRATIONAL TEMPERATURES IN THE 50 TO 150 KM ALTITUDE RANGE

by

Henry Nebel

ABSTRACT

Vibrational temperature profiles as functions of altitude have been obtained for the (001) state of carbon dioxide in the atmosphere by considering various excitation and de-excitation mechanisms for the CO_2(001) state and the first excited vibrational state of N_2. The resulting profiles have been used to calculate infrared radiance from the 4.3 micron (ν_3) band of CO_2 through the atmosphere in a limb-viewing geometry. The resulting radiance is compared with data from the Spectral Infrared Rocket Experiment (Stair, et. al., 1985). Although the calculated radiance is in good agreement with the data at 50 km, it is up to two orders of magnitude lower than the data at altitudes of 60 to 100 km. Thus additional processes and refinements must be considered. Recommendations for further work are included in this report.

A Study of the Finite Element Method in Limited Area Weather Prediction Modeling

by

Robert M. Nehs

ABSTRACT

A preliminary study of the use of finite element techniques in limited area atmospheric models was performed. This included a survey and summarization of the basic theory and programming procedures employed in finite element approximations. Attention was then focused on the fully operational Canadian model, particularly on the development of the finite element grid scheme. A key component of this is a 2-dimensional nonuniform rectangular grid which contains a subregion of high resolution. An alternative grid, consisting of a combination of rectangular and trapezoidal elements, was developed. This grid contains fewer elements in the over-all domain while maintaining the same high resolution over the area of interest. A finite element program to solve a Poison equation using a simplified version of either grid scheme was written. Runs were made with both grid types and the results were compared at the grid points within the high resolution area. The errors at most of these points were smaller for the new grid. More extensive tests should be conducted; however, these preliminary results indicate that further investigation of the new grid scheme is warranted.

Issues Related to Lithium and Lithium-Hydride

Thermal Storage Spheres

by

Douglas L.R. Oliver

ABSTRACT

Several issues related to the use of lithium and lithium-hydride spheres for space based thermal storage systems are investigated. These issues include: hydrogen diffusion rates through an outer shell of silicon carbide, the structural integrity of a silicon carbide shell, and heat transfer rates from the spheres. A numerical heat transfer code has been developed and tested to predict the heat transfer rates from the spheres with phase change and variable thermal properties.

A NETWORK TUTOR BASED ON THE HEURISTIC OF POLYA

by

Philip D. Olivier

ABSTRACT

This report describes the core of an Intelligent Tutorial system designed to help students learn basic circuit and network theory at a level taught to sophomore Electrical Engineering students. The tutorial strategy is taken from the heuristic of George Polya, in that the student is asked to answer questions about the problem at hand, and these questions are inspired by the questioning procedure suggested in Polya's HOW TO SOLVE IT. In a very real sense the student is lead through the design of the solution procedure in much the same way that students are lead through the "invention" stage of writing an essay in other CAI programs. In addition to helping the student develop a plan of attack for a particular problem the tutor described here also monitors his/her answers and attempts to diagnose the students weaknesses. It is hoped that the student not only learns some network theory but also internalizes the procedure used to elicit the answers. The tutor described here initially asks the student several questions about the solution to determine whether or not the student has successfully solved the problem. When errors are detected the tutor asks deeper questions.

Oxidative Stability and Related Studies of Silahydrocarbons

by

Harvey L. Paige

ABSTRACT

The oxidative stability of a series of seven alkyl tri(octyl)silanes, generically called silahydrocarbons, differing by branching and unsaturation of the five-carbon alkyl group, was studied using differential scanning calorimetry. It was found that there is a reproducible difference between the various compounds. Unsaturated silahydrocarbons are less stable to oxidation at elevated temperatures than are saturated analogs. A normal pentyl group on the silicon results in a slightly more stable compound than various branched isomers.

The mass spectra of the seven silahydrocarbons were studied to determine if fragmentation patterns would provide insight into the mechanism of oxidation. Attempts were also made to isolate intermediates in the oxidation of the silahydrocarbons. These studies are incomplete.

Cleansing of Bone-Marrow by Lymphokine Activated Killer Cells (LAK-Cells)

by

Parsottam J. Patel; DVM, PhD

ABSTRACT

Lymphokine Activated Killer (LAK) cells are targeted lymphocytes that kill tumor cells while not harming normal cells. The purpose of this study was to test the hypothesis that LAK cells from the patient, or allogeneic donor, can be added in vitro to bone-marrow to kill the tumor cells and not harm the normal bone-marrow stem cells. LAK cells were generated from normal bone-marrow using the techniques similar to that used for generating LAK cells from normal peripheral blood leucocytes. Whether these LAK cells would be able to lyse tumor cells, without harming the normal stem cells remains to be determined. If successful, this approach could provide the basis for in vitro treatment of bone-marrow for autologous transplantation. In other series of experiments, sera from lupus erythematosis and HTLV-III (AIDS) patients were screened for the presence of anticardiolipin antibodies. More than 90% of lupus and about 60% HTLV-III patients showed the presencce of anticardiolipin antibodies of IgG class as detected by ELISA (Enzyme Linked Immunosorbent Assay) test.

All-Aromatic Rod-Like Polymers Based on Intramolecular Cycloadditions: Model Compound Study

by

Robert A. Patsiga

ABSTRACT

Attempts were made to prepare three aryl-substituted diene-yne compounds. These compounds were to serve as model structures for study of cyclization-aromatization ability which could be extended to curing of thermally stable polymers. A precursor ketone, 1,3-diphenyl-1-propynone, and its hydrobrominated product were prepared. However, an attempt to perform a Wittig reaction on the bromoketone resulted in dehydrobromination. Another precursor ketone, vinylphenyl ketone, underwent polymerization when an attempt was made to perform a Wittig reaction on it. Coupling of trimethylsilyl acetylene with benzoylchloride and condensing lithium acetylide with benzaldehyde were unsuccessful in producing 1-phenyl-1-propynone. Recommendation is made that aldehyde structures be utilized in the syntheses because of their greater disposition to undergo the Wittig reaction.

Computer Software Executable Image Efficiency In Real-time LIDAR Applications

by

Martin A. Patt

ABSTRACT

A study comparing the efficiencies of executable-image codes generated for a real-time LIDAR application was performed for three computer source languages: C, FORTRAN, and BASIC. Programs were compiled and executed under the VMS operating system on a Digital Equipment Corporation VAX-11/780 Mainframe Computer.

A BIOMECHANICAL STUDY OF ANTHROPOMORPHIC HEAD-NECK SYSTEMS

by

Jacqueline G. Paver

ABSTRACT

Hybrid II, modified Hybrid II, and Hybrid III anthropomorphic manikin head-neck assemblies were studied. Preparations were made to measure the kinematic and dynamic responses of these mechanical head-neck assemblies to abrupt decelerations imparted to the base of the neck by a pendulum test apparatus according to existing DOT specifications for Part 572 dummy compliance testing and recommended procedures for Hybrid III compliance testing. The actual execution of these tests is planned for the upcoming year. Measurements were made of the geometric and inertial properties of the pendulum and the modified Hybrid II and Hybrid III test specimens. The measured geometric and inertial properties and pendulum test performance standards were then analyzed to determine inputs for both the Articulated Total Body (ATB) Model and the AAMRL Head-Spine Model (HSM). Data sets, which represent the Hybrid II head-neck system, were developed for the HSM and ATB Model. Simulations of the Hybrid II pendulum tests were performed and compared to experimental results in order to validate these data sets. More modeling work still needs to be done. Some additional tuning of the Hybrid II data sets is suggested. Modified Hybrid II and Hybrid III data sets need to be developed and validated.

AUTOMATIC PROGRAM GENERATION FROM SPECIFICATIONS USING PROLOG

by

Alex Pelin

ABSTRACT

A framework was built for an expert system which generates PROLOG programs from formal specifications. The system was able to generate correct programs for sorting problems. The program generator was written in PROLOG.

The specifications were presented as equations. Work was done on validating the specifications and we obtained important results in this field. There are, however, problems in translating equations into PROLOG clauses. More research needs to be done in this area.

Several heuristics were also developed for the program generator which can enable it to solve a larger class of problems.

The system uses correct rules, but it proves neither the correctness nor the termination of the generated programs. It can be augmented to do this by using the theorem prover ITP. More research needs to be done in this area, particularly in developing programs that use induction.

ELECTROCHEMISTRY IN ROOM TEMPERATURE MOLTEN SALT SYSTEMS

by

Bernard J. Piersma

ABSTRACT

Electrochemical behavior in 1-methyl-3-ethylimidazolium chloride/aluminum chloride molten salts at 25C using cyclic voltammetric, steady-state potentiostatic and rotating disk electrode techniques was investigated for several systems. Ferrocene was chosen for study since its oxidation-reduction behavior is essentially reversible and not influenced by the Lewis acidity (i.e. chloride concentration) of the melt. Compounds studied for possible electrode reactions in batteries using molten salts included CuCl and $CuCl_2$ and several sulfur compounds; sulfur, Na_2S, S_2Cl_2, and CS_2. Finally an electrochemical investigation of carbonium ion formation in neutral (equimolar amounts of MeEtImCl and $AlCl_3$) and slightly acidic (mole fraction of $AlCl_3$ greater and one half) melts was initiated with studies of 2-Cl-propane, 1-Cl-butane, 2-Cl-butane, 1-Cl-2-Methylpropane and 2-Cl-2-Methylpropane.

EFFECTS OF ACCELERATION STRESS UPON BLOOD LIPID LEVELS

BY

LEONARD PRICE

ABSTRACT

Serum total cholesterol and triglyceride concentrations of two individuals were measured after daily exposures to high gravitational forces (+Gz) simulating aerial combat maneuvers. The post-acceleration cholesterol levels were significantly higher (40-95%) than the normal resting levels. Serum cortisol levels were higher than the resting levels. This agrees with previous studies which have shown significant increases in serum cortisol levels after acceleration stress. Cortisol and total cholesterol values were significantly correlated ($r = 0.614$, $p \angle 0.05$) in one of the individuals of this study. Since cortisol is a hormone which influences lipid metabolism, there may be a causal relationship between the increased cortisol levels produced by acceleration stress and increased lipid levels. The lipid levels in the two subjects after acceleration exceeded the 90th percentile for the population as a whole. As such, they could be at high risk for subsequent coronary heart disease if they are exposed to high G-forces on a frequent basis.

An ancillary study was conducted to develop an electrophoretic method to rapidly separate and quantitate serum high density lipoprotein (HDL) subfractions HDL_2 and HDL_3. Serum levels of one of these subfractions may be a better predictor of coronary heart disease than total cholesterol. Serum α-lipoproteins isolated by affinity chromatography were separated into a number of subfractions by polyacrylamide gel electrophoresis. These subfractions were marked by the usual lipoprotein stains, and by filipin, a fluorescent, naturally occurring antibiotic which, reportedly, binds specifically to cholesterol. Identification and quantification of these HDL subfractions remain to be accomplished.

The Inter-Site Communication Services Required By a Distributed Operating System

by

Craig G. Prohazka

ABSTRACT

This report identifies the inter-site communication services required by a typical distributed operating system. These services are found to be the abilities to:

a. Transmit a datagram

b. Broadcast a datagram

c. Transmit a datagram to all of a site's neighbors

d. Establish a virtual circuit

e. Establish a full-duplex virtual circuit

f. Establish virtual circuits to all other sites

L. R. Pujara

A Computer-Aided Method of Designing Control Systems Incorporating Aircraft Flying Qualities

ABSTRACT

In this report, aircraft flying qualities have been made the main focal point for the design of control systems of an aircraft. First, "desired transfer functions" satisfying flying qualities criteria as in MIL-F-8785 are synthesized for the longitudinal direction controls for the F-16 and F-104 and then using the frequency matching technique, control systems are designed for these aircrafts such that augumented systems are "close" to the "desired transfer functions". For the lateral direction mode of an aircraft, a generic model of a "desired transfer function matrix" satisfying the flying qualities criteria is proposed. An illustrative example of a "desired transfer function matrix" for the A-7A in the lateral mode has been constructed.

Infrared To Visible Light Conversion In Rare Earth Doped Heavy Metal Fluoride Glasses

by

Richard S. Quimby

ABSTRACT

A phenomena known as "frequency upconversion" or "anti-stokes fluorescence via energy transfer" has been examined in a series of BaF_2-ZnF_2-LuF_3-ThF_4 glasses co-doped with YbF_3 and ErF_3. In this process, (low frequency) infrared photons in the 1 micrometer wavelength region are absorbed by Yb^{3+} ions, with a subsequent transfer of energy to Er^{3+} ions. Decay of the Er^{3+} excited state produces a (high frequency) green fluorescence in the vicinity of 0.55 micrometers. The effect has been extensively studied in (poly)crystalline phosphors, and is observed to be nonlinear in that two infrared photons are needed to generate one green photon. Using both a filtered arc lamp and a Nd-YAG laser, we measured the absolute efficiency of the upconversion process in glasses where the Yb^{3+}/Er^{3+} ratio was between 1:1 and 35:1. The efficiency is defined as the ratio of the green power emitted to the infrared power absorbed by the specimen. The highest efficiencies were obtained in glasses containing (mol%) 11.25 % YbF_3 and 0.75 % ErF_3. In these vitreous heavy metal fluorides, the upconversion efficiency is 3-4 orders of magnitude greater than that observed in equivalently doped oxide glasses, and compares very favorably with results obtained for Yb^{3+}/Er^{3+} containing crystals.

Optimization of Actively Controlled Structures Using Multiobjective Programming Techniques

by

Singiresu S. Rao

ABSTRACT

The design of minimum weight structures with constraints on the damping parameters of the closed loop system in the design of an active control system is considered using multiobjective optimization techniques. The cross sectional areas of the members are treated as design variables. The structural weight and the controlled system energy are considered as objective functions for minimization. The goal programming and game theory approaches are used for the solution of the multiobjective optimization problems. The feasibility of the approaches is demonstrated through the design of a two-bar and a twelve-bar truss structures.

Development of a Rapid and Sensitive Assay Procedure for the Detection of the Protozoan Parasite *Giardia lamblia* in Drinking Water Supplies

by

Ralph J. Rascati

ABSTRACT

The development of procedures for concentration and detection of the protozoan parasite *Giardia lamblia* were initiated. Membrane filtration was used for concentration of the cysts from water supplies and an immunoassay is to be developed for the detection of cysts. Development of the immunoassay procedure will take longer than the ten-week period available but the preparation of antibodies against *Giardia* cysts was begun by injecting rabbits with cyst preparations. The injection schedule and part of the bleeding schedule were completed during the summer period. The bleeding schedule should be completed and the sera obtained used for development of the assay procedure. Testing of the membrane filtration procedure for concentration of cysts was undertaken using water samples deliberately seeded with known amounts of *Giardia* cysts. It was found that filters with a pore size of 3 um were more efficient (14-50% recovery) than filters with a pore size of 5 um ($\leq$ 17% recovery). Although the larger pore filters could process slightly larger samples before filter clogging occurred the difference in sample size did not fully compensate for the decreased recovery efficiency. These results are however, preliminary and further work is needed to establish the relationship between water quality, maximum sample size which can be processed and recovery efficiency for the two different pore size filters. A field trial of the concentration procedure demonstrated its ease of use. However, although *Giardia*-like objects were observed they could not be unequivocally identified. This serves to strengthen the need for the objective immunoassay procedures.

State Variable Model of the Cardiovascular System and a Controller Design for an Anti-G Suit

by

Kuldip S. Rattan

ABSTRACT

A state-variable model of the cardiovascular system under $+G_z$ stress was implemented. The model (which includes simulation of the arterial and venous systems, heart, baroreceptor control of the heart, and venous tone, and inputs for acceleration force and externally applied pressure) was used to study the impairment of cerebral function during $+G_z$ stress. It was found that even though eye level blood pressure decreases significantly during G_z stress, cerebral blood flow is maintained due to a compensatory mechanism which compares favorable with the experimental results found in the literature. This model will be used to investigate the effectiveness of anti-G suits. Finally, a preliminary design of a closed-loop control system for an anti-G suit was carried out. It was found that it is possible to control both the rise time (which is needed for the improvement of G-valve) and the overshoot of the suit pressure. More work needs to be done both in the simulation and design areas.

A COMPARISON OF TWO MATHEMATICAL SYSTEMS FOR A STANDARD IMAGE ALGEBRA

by

Barbara S. Rice

ABSTRACT

Advances in image sensor technology have provided large amounts of data for image processing. There are many techniques, but at this time there is not a unified method for image processing. The Air Force Armament Laboratory, Eglin AFB, Florida, wishes to obtain a standard for expressing image transformation algorithms. Two efforts, FO 8635-84-C-0296 of the Singer/Kearfott Division and FO 8635-84-C-0295 of the University of Florida, have been made in developing an Image Algebra.

The Singer effort defines basic operations which can be interpreted as certain manipulations of gray level functions. Special image processing techniques are effected through appropriate combinations of the basic operations.

The Florida group uses the template structure and defines operations on images and on templates. Specific image processing techniques are effected by utilizing appropriate templates and operators. Template representation and decomposition results are important.

This report provides a comparison of the two systems.

Multi-Echelon Inventory Models for EOQ Items

by

Dan B. Rinks

ABSTRACT

Two models of the Air Force's depot-base inventory system for EOQ (consumable) items have been constructed. The first model, a static model of the D062 wholesale (depot) requirements system, is useful for studying the effects, on the depot, of changes in depot stockage policies. The second model is a simulation model of the multi-echelon system. The simulation model can be used to study how changes in stockage policies at one level affect the stockage policies at the other level. Preliminary results from analyses using these models are reported.

Preliminary Development of a Global Positioning System Package for use in Determining Exact Position of AFGL Research Balloons at Precise Times

by

W. Paxton Robey

ABSTRACT

The Air Force Geophysics Laboratory is involved in upper atmosphere research using high altitude balloons to carry scientific instrument packages. Two of the requirements are the tracking of each balloon for safety and recovery of the payload, and determining the precise position of the payload at the exact time each experiment is conducted. The Global Positioning System, a satellite radio navigation system, is now available and the adaptation of it to AFGL balloon flights is desirable. Moderate cost commercial GPS receiving equipment is now available which can be adapted to this use. This paper discusses the status of the hardware and software at this time and makes recommendations for proceeding with the incorporation of a balloon borne GPS receiver with telemetry for transmission to a ground station. Two areas of concern are the suitability of commercially available software for operation on an unmanned stratospheric balloon and the interfacing of the asynchronous RS-232 GPS output to S-band telemetry.

KINETIC PROCESSES IN ADVANCED ALLOYS

by

Kenneth C. Russell

ABSTRACT

Various kinetic and thermodynamic criteria proposed to predict the occurrence of terminal solid solubility extension (TSSE) under rapid solidification are discussed. A new criterion based on Miedema's macroscopic atom model for solution thermodynamics is found to predict TSSE very well for Al-based alloys. The criterion is presently being extended to other binary alloys where there exists an adequate data base.

The theory of particle coarsening is extended to show that small dispersoid particles located on grain boundaries or dislocation lines may undergo preferential coarsening. A theory is developed which predicts that dispersoid particles may sometimes be dragged by migrating grain boundaries. The predictions of enhanced coarsening and particle dragging are in general accord with experimental observations on Ti and Ti_3Al based alloys.

COMPUTER MODELING OF INFRARED SIGNATURES

by

Sally A. Sage

ABSTRACT

This report describes a computer model for infrared radiation (IR) signatures. The goal of the system is to use a data file describing an air target to produce a computer-generated IR image that corresponds closely to an actual IR photograph of that target. The IR image provides information which can then be used to calculate the IR signature of the target. The target is modeled by a set of three-dimensional triangular facets which covers its outer surface. The target's plume is also based on a facet model, but the plume is generated interactively so that a user can control the details of the plume's construction. The three-dimensional coordinates of the target and plume are rotated using user-specified sensor angles. The coordinates are then projected into the YZ plane to produce a two-dimensional image. The image is composed of facets in the sensor's line-of-sight. These facets are assigned temperatures and then the area of each set of facets which corresponds to a particular temperature is calculated. The IR target signature can then be computed by the integration of the radiance over the projected area of the target along the line-of-sight of the sensor.

Swirling Flows in Dump Combustors

by

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ABSTRACT

A series of experiments were conducted to study isothermal swirling flows in a dump combustor configuration. A two-component coincident LDV system was utilized for detail mean flow and turbulence measurements in the axial and tangential directions. To have optical access for two-component measurements and to minimize disturbances, a small flat window was used and the inlet to the combustor was moved relative to the combustor by using a novel traversing system. Two constant angle swirl generators with swirl numbers of 0.3 and 0.5 were tested. Only 0.5 swirler generated sufficient axial pressure gradient to produce central recirculation which extended approximately 4.5 times of the step height downstream of the expansion plane. The corner recirculating flows were present in both cases with a smaller recirculating region in the stronger swirler. Very large scale turbulence structure was measured in the central core of both flows; the structure was extremely large in the shear layer between the wake behind the hub and the main flow. The decay of large scale motion was very rapid in the stronger swirler flowfield. While 0.3 swirler flowfield became a single solid-body rotational flow after approximately two combustor diameters, the 0.5 swirler flowfield was combination of solid-body rotation at the central core and constant angle swirl flow outside of the central core even at four combustor diameters downstream.

RESULTS OF A BRIEF INVESTIGATION OF TWO ALTERNATIVE ENERGY SYSTEMS

by

John F. Schaefer

ASTRACT

Analyses of two different alternative energy system concepts are treated. The first analysis is of certain characteristics of a generic class of photovoltaic energy systems. Specifically investigated was the fidelity of a commonly-used mathematical model of a generic photovoltaic array. The model was then used to study relative performance of two commonly-used techniques to extract near-maximum energy from photovoltaic arrays. Results indicate that the simpler, but infrequently employed, technique is superior to the more commonly implemented method.

The second analytical effort is a study of a novel wind energy machine, conceived by the author several years ago. The machine's potential advantage is performance/cost ratio. Analytical and computer simulation results confirm that the device will work; however, time constraints did not allow simulation confirmation of the analytically-predicted optimum choices for system parameters.

RAMAN SPECTROSCOPIC INVESTIGATIONS ON GROUP IIIA DOPED SILICON CRYSTALS

by

James Schneider

ABSTRACT

Raman spectroscopic studies of extrinsic p-type silicon crystals conventionally doped with group IIIA elements were undertaken with samples near 77K and 4K cryogenic temperatures. Incident light pulses from a Q-swsitched Nd:YAG laser with near IR wavelengths available at 1064 nm, 1074 nm, or 1123 nm among others were used with rectangular shaped doped silicon crystals to provide a 90 degree scattering geometry. Boron doped samples definitly show an electronic Raman scattering interaction at 184 cm^{-1} (23 meV) from the incident laser energy. With gallium doped samples a background fluorescence is evident even with samples held near 4K and when using 1074 nm light. At that temperature this laser energy should be below the band-gap energy for high quality silicon, so the fluorescence was not expe:ted. The existence of a peak due to a Raman interaction is not observed above the level of this fluorescence in gallium doped silicon.

AN INTENTIONAL TUTOR

by

Richard M. Schori

ABSTRACT

The Air Force is interested in the development of a tutor for helping with the ground-based training of tactical fighter pilots. Such a training device would have applications in any teaching/learning environment. Contributions were made in 1) the collection and mathematical modeling for learning strategies for the tutor and 2) the method of knowledge representation for the tutor. Fuzzy set theory was used in the mathematical modeling project. Fuzzy sets give a convenient mathematical method of describing subjective concepts such as a "moderately high" level of knowledge. For knowledge representation, the notion of a genetic graph is used to develop what is called a "graph of contents" of a given text file. In a genetic graph the nodes represent concepts, facts, or rules and the links represent relationships between the nodes such as prerequisite, specialization, or analogy.

Polynuclear Aromatic Hydrocarbons in Particulate Turbine Engine Exhaust and From Combustion of Single Compound Fuels

By

Dr. William D. Schulz and Miss Mary R. McGill

ABSTRACT

Particulate exhaust samples of turbine engines and a combustor rig were sequentially extracted with methylene chloride, benzene-methanol and toluene. No solvent was found superior to methylene chloride for the entire range of polynuclear aromatic hydrocarbons (PNAs) in these samples.

Turbine engine exhaust samples from three engines at four different power settings were extracted, concentrated and analyzed. Analysis was by G.C. (F.I.D.) and GC/MS. Blanks and samples contained large amounts of plasticizers and filter loadings were too low for reliable quantitation or identification by GC/MS. G.C. (F.I.D.) analysis and identification by retention times indicated that PNA concentration was highest at the "idle" power setting and that it was also higher for the one afterburning sample.

Samples of exhaust particulates from a bluff body combustor, burning pure acetylene, propane, propene, butane, 1-butene and isobutene were extracted, concentrated and analyzed. Soot yield of the fuels was not determined. Higher concentration of higher molecular weight PNAs were found for the aliphatic compounds with unsaturation and for isobutene, with unsaturation and branching.

Systems Effectiveness Concerning Vulnerability of Hardened Targets to a Variety of Weapons

by

Meckinley Scott

ABSTRACT

This work resulted from a study of several technical reports concerning vulnerability of hardened targets to a variety of weapons. The main objective is to refine and improve some of the methodologies in current use for evaluating target effectiveness. A target usually consists of two or more subsystems, each of which is made up of a number of components. Effectiveness of a subsystem is a random variable whose sample space is a subset of the interval [0,1]. Basic to the problem of evaluating the overall target effectiveness is the determination of the probability density functions of the random variables associated with the various subsystems of the target. In this work, appropriate methodologies are discussed to evaluate target effectiveness for a wider class of targets than those being presently considered. Computer programs presently used can easily be modified to handle a variety of more complex targets. Some areas for further research are briefly discussed.

Resolution of Laser Beam Intensity Spots by the Target Plate Measuremnt Technique

by

Martin A. Shadday Jr.

ABSTRACT

The intensity distribution in the beam of a high power CO_2 continuous wave laser can be measured by the target plate measurement technique, developed at the Air Force Weapons Laboratory. The laser beam is directed on to the polished surface of a thin metal plate, and its intensity distribution is measured by observing the transient response of temperature sensitive paint on the rear surface. In order to predict the intensity distribution on the front surface of the plate, one-dimensional heat conduction is assumed. The capability of this technique to resolve narrow intensity spots was investigated by modeling the heat transfer in the target plate numerically. The importance of conduction parallel to the plate surface is quantified.

Propagation of Lamb Waves in Fibrous Composite Material

by

Nisar Shaikh

ABSTRACT

The imaging of composite materials has made tremendous progress. There is need for continuing research in wave propagation phenomena to meet the needs of ongoing technological development in explaining and characterizing various complexities.

The behavior of Leaky Lamb Waves in fibrous composite materials is studied with particular emphasis on dispersion and the corresponding energy flow directions. Some interesting results are obtained pointing to possible additional modes when propagation occurs along off-symmetry axes. The energy flow study also strongly suggests further avenues for investigation.

The report describes the experimental technique used and the necessary fixtures that were designed and fabricated. The results of various tests on Graphite-Epoxy specimen are presented.

Pharmacokinetics of Certain Substances of Abuse: A Review of the Literature

by Dolores C. Shockley

ABSTRACT

This report presents a concise summary of the pharmacokinetics of certain agents that act on the central nervous system and that are abused in society. Pharmacokinetics includes the absorption, distribution, biotransformation (metabolism) and excretion of xenobiotics. A description is presented of the dynamic relationship between the substances and the body: how the body acts on the agent rather than how the agent acts on the body (pharmacodynamics). Agents included in the report are currently or soon will be determined qualitatively and quantitatively by urinalysis at the Air Force Drug Testing Laboratory. These include marihuana (THC), cocaine, barbiturates, amphetamines, opioids, lysergic acid diethylamide (LSD), and phencyclidine (PCP). Other areas addressed include some of the physicochemical properties of the agents and the influence of urinary pH on excretion.

The thrust of the report is to present relevant excerpts of what is known about the pharmacokinetics of these abused agents to assist in interpretation of urinalysis data.

CONTRAST SENSITIVITY AT LOW LUMINANCE LEVELS

by

William D. Shontz

ABSTRACT

This research involved the study of contrast sensitivity under four luminance levels representative of those found in flight training simulator visual display systems. Contrast sensitivities for a range of luminance levels (32.3 ft L, 7.5 ft L, 2 ft L and .5 ft L), and spatial frequencies (.5, 1, 3, 6, 11.4 and 22.8 cycles/degrees) were assessed. A sample of subjects larger than is typically found in studies of contrast sensitivity was drawn from the personnel at AFHRL, Williams AFB. Luminance level was found to produce significantly different contrast sensitivity functions (CSFs) at intermediate and higher spatial frequencies. This finding has important implications for the recommendations given to design engineers regarding trade-offs in luminance, contrast, and resolution requirements for visual displays in flight simulators. The relatively large and heterogenous subject sample permitted evaluation of the effects of several subject variables. Post hoc analyses were conducted to assess the effects of corrected vision, age, and gender. None of these variables produced significant effects on contrast sensitivity. However, the psychophysical procedure used may have permitted response biases which could obscure sensitivity differences. Recommendations on these and other issues were made.

I. INTRODUCTION:

There is a remarkable match between the areas of ongoing research at AFHRL/OTE, Williams AFB and my background in research and teaching. The extent of this match is best illustrated with a table format.

SHONTZ BACKGROUND	AFHRL RESEARCH AREA
- Eye dominance and design of helmet-mounted displays	Fiber Optic Helmet Mounted Display development program
- Value coding in Visual search - Color coding in visual search	Use of color in simulator displays
- Predicting operator performance in reconnaissance systems	Level of target detail require-mentsfor computer image generation systems. Visual

Aerodynamic Parameters for a Rapidly Pitching Airfoil

by

William D. Siuru, Jr., PhD, PE

ABSTRACT

The key aerodynamic parameters, lift, pressure drag, and moment coefficient were analyzed for a rapidly pitching airfoil. The investigation was based on extensive wind tunnel data obtained for a NACA 0015 airfoil pitched at rates between 115 and 1380 degrees/second to a maximum angle of attack of 60 degrees. Maximum as well as average values were determined as a function of the non-dimensional parameter alpha +. The angles of attack at which maximum coefficient values occured were determined also as a function of alpha +. Empirical expressions were found for the key coefficients as a function of alpha +.

Aircraft Sortie Effectiveness Model

by

Boghos D. Sivazlian

ABSTRACT

A mathematical model describing the sortie of a single aircraft under enemy threats, attacking a single passive target is developed. Emphasis is placed on the determination of the probabilities associated with the various events in the sortie. These probabilities are then used to derive appropriate measures of effectiveness. The general methodology may be used to explore more complex sortie models.

Combustion Under Supercritical State and Influence of Radiation on Droplet Combustion

by

S. H. Sohrab

ABSTRACT

The influence of radiant heat transfer on combustion of single hydrocarbon liquid droplet in stagnant oxidizing atmosphere is analytically investigated. The method of matched asymptotic technique is applied based on high temperature sensitivities of chemical reaction and radiation processes. Also, the influence of radiation as it enters a partially opaque liquid droplet is analytically studied. The results show how the critical Damköhler number at extinction is modified because of the radiation from the flame zone. The existing theoretical and experimental investigations in the literature on supercritical droplet combustion are reviewed. Finally, an outline of particular research areas in need of further experimental investigations is presented.

X-ray Topographic Characterization of Si and GaAs

by

S. R. Stock

Abstract

Synchrotron White Beam Topography (SWBT) was used to study the dislocation structure in a number of GaAs and Si specimens. The topographs revealed considerably higher dislocation densities in conventionally prepared single crystal and polycrystal GaAs than in single crystal GaAs grown in a low thermal gradient. Wafers of GaAs alloyed with In were also examined. Lower dislocation densities were observed, and the dislocations were widely spaced in slip bands. Two types of concentric striations were observed (one of which has not apparently been observed previously): the normal diffuse striations and narrow, sharply-defined striations. An epilayer of Ga-doped CVD Si on an (001) Si substrate and an ion-implanted Si wafer were also studied.

This study provides the foundation for use of x-ray diffraction topography as a problem solving tool in the Materials Laboratory. If electrical measurements, for example, reveal anomalous properties, x-ray topography can reveal the responsible crystallographic structure; and this data will allow rational redefinition of process parameters. Areas where topography will make an immediate impact are suggested.

ASSESSMENT OF MAXIMUM ENTROPY METHOD SOFTWARE BY OPERATION ON INTERFEROGRAMS OF MODEL SPECTRA

by

James E. Sturm

ABSTRACT

Software available for reduction of interferometric data by the maximum entropy method (MEM) was applied to computer-fabricated data sets representing simple delta-function line patterns. In each case a data set of noise signals with a Gaussian intensity distribution was added. The combined data set resembled in form those obtained from the AFGL LABCEDE facility.

The main MEM parameter studied was the "order of the prediction error filter." Generally, more closely-spaced lines required higher orders to achieve resolution. Small shifts in peak position were also generated. For a given peak separation the order needed increased as the number of lines in the spectrum was increased. Recovery of all lines of the model was achieved at less than half the line separation resolvable by the fast Fourier transform (FFT) algorithm. In representation of five-line spectra, the MEM generated spurious line splitting at higher orders. Although line intensities were not reproduced in all MEM spectra, integrals over the line widths appeared to match those of the models as long as no line splitting occurred.

AI and Large-Scale Systems Approaches to

Enhanced Situation Awareness in Missile Warning Systems

by

Edgar C. Tacker

ABSTRACT

A "top-down" view of a missile warning C^3 system was described and then particularized to apply to the SIMCOPE missile warning problem. The cognitive tasks required of the missile warning officer (MWO) were analyzed and modeled via an "*information processing matrix*". A "descriptor language" for precisely formulating hypotheses relative to the MWO decision making process was outlined and a particular type of decision-aiding expert system was recommended for enhancing the MWO' situation awareness. Several natural extensions of this research were described, and an appropriate sequencing of these proposed research topics was given.

FEASIBILITY INVESTIGATION OF SINGLE-STEP NITRATIONS OF ORGANOMETALLICS BY NITRONIUM TRIFLATE

by

Dr. Nicholas E. Takach

ABSTRACT

The attempted single-step nitration of n-butyllithium by nitronium tetrafluoroborate and by nitronium triflate is described. The use of ultrasonic energy to activate these heterogeneous systems is discussed. The desired product, 1-nitrobutane, could not be isolated in any of the reactions involving either nitronium salt, despite widespread variations in the reaction parameters. Instead, evidence exists that 1-nitrobutane reacted with additional n-butyllithium to form the nitronate salt, $CH_3CH_2CH_2CH{=}NO_2^-Li^+$. The results suggest that formation of the nitronate salt is faster than that of 1-nitrobutane. The attempted nitration of t-butyllithium by nitronium tetrafluoroborate also failed to yield the desired product. With t-butyllithium, nitronate salts cannot form but other side products are possible. The procedure used for preparing nitronium triflate was not reproducible due to the exothermicity of the reaction and the difficulty in trapping the intermediate product, N_2O_5. Suggestions are made for improvement of the synthesis.

DISSIPATION OF PLASMA CLOUD GENERATED BY THIRD STAGE ROCKET SEPARATION

by

Arjun Tan

ABSTRACT

The plasma cloud generated by third stage rocket separation by means of explosive bolt pyrotechnic causes temporary disruption in the radar signals tracking the space vehicle and the burnt-up third stage. This study describes a theoretical investigation of the dissipation of the plasma cloud thus generated. It is estimated that around 10^{24} positive and negative ion pairs are generated in a typical third stage rocket separation using the common explosive of gunpowder. The dissipation of plasma due to diffusion and recombination separately are studied. It is shown that when loss processes are neglected, the plasma disperses in a Gaussian mode. The evolution of the cloud in the first 10 seconds after explosion is determined for both isotropic and anisotropic media and by using Sutton's formula. A notable feature of the anisotropic diffusion is the elongation of the cloud in the direction of the larger diffusion coefficient. The effects of recombination processes are studied for the quadratic, linear and altitude-dependent loss rates. For quadratic loss, the ion density decreases dramatically in the first second, but then declines more gradually to levels depending solely on the loss coefficient. The destruction of ions is exponential and generally more severe in the linear case, but the loss rate decreases significantly if the altitude-dependence is taken into consideration. It is suggested that the dissipation of the plasma due to the combined effects of diffusion and chemical loss be investigated as a follow-up study.

SURFACE ROUGHNESS EFFECTS ON HEAT TRANSFER AND SKIN FRICTION

by

Robert P. Taylor

ABSTRACT

Results are presented from a theoretical study of the effects of surface roughness on adiabatic wall temperature. This study was undertaken to determine the appropriate conditions required to use a turbulent circular Couette flow as an experimental test bed to study the effects of surface roughness on adiabatic wall temperature. It was concluded that the circular Couette flow is not an appropriate test bed for this purpose.

In addition, results are presented from profilometer measurements of surface roughness of inservice turbine blades. Data reduction techniques are developed to compute the roughness height distribution functions, auto correlation functions and power spectral densities for these profiles.

ATMOSPHERIC MODELING FOR OPERATIONAL TACTICAL DECISION AID

by

Ken Tomiyama

ABSTRACT

The Tactical Decision Aid (TDA) is an integrated target/atmosphere/sensor model that is used to estimate target acquisition ranges for infrared sensors. It employs an extensive 8000 plus-line computer code, LOWTRAN, to evaluate the atmospheric extinction of infrared signals for various climatological conditions. The Operational TDA (OTDA) is a simplified version of the TDA housed on a hand-held computer. It is intended for field use. Since LOWTRAN is too voluminous to be employed for the OTDA, pre-computed extinction data tables are currently in use. The process of manual input of data from the tables to the OTDA is cumbersome and is prone to erroneous readings. Therefore, it is proposed to develop compact atmospheric extinction models which may be coded onto hand-held computers. Various types of atmospheric extinction, which are significant for the TDA application, were considered and simple models were developed based on the LOWTRAN computation.

Vigilance Behavior of Military Personnel: A Study of Individual Differences

by

Phillip D. Tomporowski

Abstract

The sustained attention and cognitive abilities of 829 military personnel were assessed during a 3-hr test period. Testing included a 60-min visual vigilance task and seven tests of information processing. Subjects were assigned randomly to complete one of four vigilance tasks that differed in cognitive complexity. All subjects completed the seven information processing tests. Tests were administered via computer-controlled systems. In addition, subjects completed the Armed Forces Vocational Aptitude Battery (ASVAB). Initial data analysis revealed the vigilance abilities of observers were differentially influenced by the complexity of the task. Individual differences in vigilance behavior will be evaluated by correlating each subject's vigilance performance to measures of information processing abilities and general aptitude.

An Investigation of Unsteady Vorticity Production by a Pitching Airfoil

by

T.R. Troutt
J.A. Albertson

Abstract

This research investigation concentrated on developing insight into the unsteady aerodynamics produced by pitching airfoils in uniform airstreams. The specific experimental situation addressed involved a two-dimensional NACA 0015 airfoil which was pitched at constant rates through angles of attack from 0-60 degrees. The experimental results analyzed included high speed motion picture flow visualizations and simultaneous pressure measurement from eighteen chord locations distributed over the surface of the airfoil. The research techniques employed involved both the development of simple analytical procedures for computation of the vorticity generation rates by the surface of the pitching airfoil and digital image techniques for enhancing and quantifying interpretations of the visualization results. The analytical results demonstrate that the nondimensional parameter $\alpha^+ = \dot{\alpha}c/U$, where $\dot{\alpha}$ is the airfoil pitching rate, c is the airfoil chord length, and U is the free stream velocity, should be the primary parameter for predicting the relative influence of pitching rate and free stream velocity on the unsteady aerodynamics around an airfoil. This result agrees closely with experimental findings. The results from the image analysis techniques show that the initiation of the dynamic stall vortex on the airfoil top surface corresponds closely to a halt in the increase in lift as a function of attack angle curve. The subsequent fast growth of the dynamic stall vortex is found to accompany a rapid decrease in the lift on the airfoil.

Dr. C. Randal Truman

A Study of Turbulence Models for Predicting Aero-Optic Interactions

ABSTRACT

Turbulence models for the prediction of aero-optic interactions were surveyed. It was found that the prediction of index-of-refraction flucuations which degrade the quality of a coherent beam traversing the field is not feasible at present. Thus a series of predictions and measurements is proposed to determine the relationships between index-of-refraction flucuations and turbulence quantities which can be predicted and measured. Preliminary predictions and laser-Doppler velocimetry measurements of an axisymmetric jet were made.

The implementation of a sequence of successively more complex turbulence models is proposed for comparison with measurements of velocity, density, or temperature flucuations for a model shear layer. These results will be compared with measurements of optical quality of the shear layer using laser interferometry or similar techniques. The predictions should culminate in a second-order turbulence model which can accurately predict the complex turbulent flows of interest for chemical lasers. The validation of the turbulence models by measurements for a model shear layer is necessary before reliable predictions of more complex flows can be made.

Analysis and Fate of Organic Components of

Aqueous Film Forming Foams

by

Roy M. Ventullo

Abstract

Analytical methods were developed to determine the biodegradation of specific organic components of aqueous film forming foam (AFFF) in laboratory scale microcosms. To this end, surfactant and non surfactant organic components were separated , identified, and quantitated by high performance liquid chromatography (HPLC), gas chromatography - mass spectrometry (GC/MS), and specific analytical methods for surfactants. Reversed phase HPLC was used extensively in attempts to separate and detect both fluoro- and hydrocarbon surfactants. Several of the methods were used to conduct initial biodegradation studies using soil and water from the base fire training facility. Biodegradation of the ethylene glycol monobutyl ether solvent and the anionic surfactants was noted. Further laboratory (analytical and biodegradation) and field work is required to establish the rate and extent of biodegradation of AFFF components.

Comprehension and Cohesion of Text

by

Doris J. Walker-Dalhouse

ABSTRACT

The issues of discourse analysis, schema and reading comprehension were examined and relevant literature read. An annotated bibliography was compiled on research relative to the underlying theoretical foundation of cognitive text processing and reading comprehension. Walter Kintsch's Model of Discourse Analysis was analyzed in relative depth to ascertain its implications for research in Reading and applicability to the field of Artificial Intelligence. Air Force technical training manuals were examined to informally assess the tecnical demands made upon the reader. Preliminary thought was given to the relevance of the Kintsch model to the understanding of technical prose.

Effect of Hyperoxia on the Permeability of the Blood-Brain Barrier in the Rat

by

Donald W. Welch, Ph.D

ABSTRACT

The overall objective of this project was to examine the effect of increased partial pressures of oxygen on the permeability of the blood-brain barrier (BBB).

Sterile surgical techniques were developed to chronically implant silastic catheters in the jugular vein in rats. With daily flushing these catheters remained patent for 8-14 days. Blood-brain barrier integrity was evaluated under blind conditions using sodium flourscein as the permeability marker. Tissue was examined at ten different levels of the central nervous system. The tissue was examined with a dissecting scope while simultaneously being exposed to ultraviolet light in a specially constructed light box.

Rats were exposed to hyperbaric oxygen at 2.0, 2.5 and 3.0 atmospheres absolute (ATA). The maximum exposure employed was 3.0 ATA for a total of 210 minutes on 100% oxygen. Even under these severe conditions the BBB of the rat could only be termed as "minimally leaky". It was decided that these studies should be expanded to rabbits and guinea pigs to compare our results with those previously reported. Rabbits and guinea pigs exposed to 100% oxygen at 3.0 ATA for a total of 90 minutes showed a dramatic increase in BBB permeability when compared to controls. These preliminary observations indicate a significant difference in the susceptibility of the blood-brain barriers of these species to hyperoxic conditions.

Multimodal Information Exchange for Individual and Group Problem Solving

by

A. Rodney Wellens

ABSTRACT

USAF C^3 systems represent the organizational equivalent of neural networks for Air Force operations. Recent research efforts within the Human Engineering Division of AAMRL have attempted to improve USAF C^3 systems by developing design guidelines based upon the performance of humans and machines as information processors and decision makers. The task undertaken by the present investigator was to explore the ways in which studies of advanced multichanneled telecommunication systems might be incorporated within the context of an established C^3 Operator Performance Engineering (COPE) project.

A three tiered analysis of the problem was conducted involving appropriate literature reviews, observations of ongoing experiments and visits to available field sites. An on-site computerized search of the artificial intelligence and social psychology literatures was conducted to analyize person-machine interactions within advanced information processing systems. An observational study was also conducted in conjunction with an ongoing team problem solving experiment to determine the role of verbal and nonverbal communication factors in clustered and segregated team configurations. Finally, visits were made to local teleconferening facilities to discover the benefits and drawbacks of a variety of computer, audio and video system hardware configurations.

Results have been reported in three separate reports written by the investigator that are on file in AAMRL/HEC. Recommendations are given regarding future COPE experiments based on both theoretical and applied concerns.

Preliminary Study of an Optical Implementation of the Conjugate Gradient Algorithm

by

Stephen T. Welstead

ABSTRACT

An analysis was done on an acousto-optic signal processor in order to make recommendations about possible improvements in the algorithm being used. The optical nature of the processor necessitates looking at data in an analog, rather than digital, fashion. The minimization problem, which the processor is solving, is formulated in an analog way. This leads to an operator equation in Hilbert space, rather than the usual matrix equation. Operator theoretic versions of steepest descent and conjugate gradient algorithms are discussed. Block diagrams are given for these algorithms, along with recommendations for possible optical implementations.

ASSESSING COGNITIVE SKILLS THROUGH A SUPERVISORY CONTROL SIMULATION

by

SHIH-SUNG WEN

ABSTRACT

The present study intended to investigate the ability of the NASA-Ames Supervisory Control Simulation (SCS) to measure general intelligence and visuospatial skills of Air Force crewmen. Subjects performed computer-displayed SCS tasks which require attention, concentration, estimates of time, memory, visuo-motor coordination, judgment, and strategies. The data collection was not completed due to the time limit in the summer research program. A continuation of the research through a Mini Grant was recommended.

HYPERBARIC (3ATA) OXYGEN 100% THERAPY AS AN ADJUVANT IN THE TREATMENT OF RESUSCITATED (BROOKE FORMULA) GUINEA PIG BURN ([illegible], [illegible] BSA) SHOCK.

by

Stanley J. Whidden, M.D., Ph.D.

ABSTRACT

Twenty four (24) male guinea pigs (400± 35 kg) with indewelling arterial and venous catheters and indwelling thermistors were temporarily anesthetized with Metofane and scalded through a template in 100°C water to produce a full skin thickness burn over 40% of the BSA. These animals were treated with the Brooke resuscitation fluid formula isobaricly or hyperbaricly O_2 (100% 6 ATA). All animals showed a post burn (PB) decrease 2°C±.3 in body temperature and 50% drop in cardiac output. The burn produced a hemoconcentration at 1/2 hour PB which returned to preburn by 6 hours in both groups. Plasma lactate levels rose PB in all samples but were higher in the isobaric group. Glucose plasma levels increased sharply 30 minutes PB but returned at three hours and remained there for the rest of the experiment. Blood pH was acidotic in all groups with blood O_2 levels being higher in the hyperbaric O_2 group. Heart rate and blood pressure both dropped PB at 1 hour but recovered by 6 hours in both groups. Histopathery samples are still being studies and as of this time there are no conclusive observations. These data trend to indicate that there was some improve-ment on the hemodynamic and metabolic changes during burn shock in the guinea pigs treated with hyperbaric O_2 (3 ATA 100%) and Brooke Formula as compared to isobaric (1 ATA 100%) and Brooke Formula. More work needs to be done to delineate these observations by the addition of more central control groups.

Analytical Computer Modeling of the
NPN BICFET Device

by

Dennis Whitson and W. David Schmidt

ABSTRACT

A computer program was written for an analytical model of the NPN Bipolar Inversion Channel Field Effect Transistor (BICFET) device. From this analysis a number of conclusions can be drawn: (1) Type of metal used is extremely important; (2) The "Fermi Factor" which determines the electron population in the spike layer could be crucial and the spike layer may have to be grown in the semi-insulator rather than the semiconductor; (3) Collector stretch may be negligible at realistic current density values; (4) For the GaAs/AlGaAs system a functioning NPN device may be easier to fabricate than a PNP device; (5) There are two independent gain factors: (a) the exponential argument which depends on ψ_{ms} and (b) p_o which depends only on the density of the spike layer dopant.

WOMEN IN THE WORKFORCE: OCCUPATIONAL PULMONARY DISORDERS

by

Shirley A. Williams, Ph.D.

ABSTRACT

Although policies, scientific and legal effort have been directed toward limiting the adverse effects of the work environment on the individuals in the workforce, very little attention has been focused on the overall health status of women in the workforce. In addition, comparatively few cohort studies have been devoted to the description of health hazards experienced by women in non traditional as well as traditional occupations. This report describes some pulmonary disorders experienced by women in the workforce, with major emphasis on beryllium lung disease. Because of its elusive nature and degenerative effects on lung tissue as a result of physiological stress, I am submitting an experimental protocol as my mini-grant proposal to define the mechanism(s) of action of beryllium on pulmonary architecture and function.

MECHANISMS OF CHROMATIC CONTRAST

by

Billy R. Wooten

ABSTRACT

The question of whether chromatic contrast is recurrent or non-recurrent was explored using psychophysical procedures. Stimuli were presented to four observers by a three-channel maxwellian view optical system. The target consisted of a four-element bulls-eye pattern. The central spot was varied in wavelength in order to determine each subject's unique yellow using a variety of color conditions for the several annuli. The basic experimental question was whether or not the contrast effect of a region of the visual field is influenced when its appearance is altered by contrast with another region of the visual field. Although more research is required, we tentatively conclude that contrast-induced color appearance has no effect on adjacent regions of the visual scene. Thus, chromatic contrast seems to behave like a non-recurrent network.

Continuum Analysis of Low Pressure
Tube and Nozzle Flows

by

Daniel W. Yannitell

ABSTRACT

Fluid dynamics codes available on the Air Force Rocket Propulsion Laboratory computer system were evaluated as possible means to provide input data for Monte Carlo analysis of tube and nozzle lip area expansion flow. This is to be compared with experimental data to be taken at the Laboratory. The VNAP2 code was chosen for further study, and several numerical experiments were run to test the feasibility of its use for this project. It is concluded that careful use of the code should provide sufficiently accurate and detailed results for single specie gases.

CHEMICAL KINETICS OF HIGH TEMPERATURE AIR
FOR MACH 5 - 14 FLIGHT

by

T. Gary Yip

ABSTRACT

A chemical kinetics model for Mach 5 - 14 hypersonic flow fields has been formulated. The model consists of 20 reactions. Previously published models all have a wrong NO removal mechanism. A correct reaction path is adopted in the present model. For Mach 5- 14, there is only one dominant ionization process identified by earlier experimental and theoretical studies. It is the ionizing atomic collision of N and O atoms to form NO^+ and e^-. This reaction is also in the model.

The rate constant expressions for the 20 reactions have been selected through a review of old and more recent rate data obtained in kinetics studies using more precise experimental technique.

A one-dimensional, steady, inviscid, chemically non-equilibrium flow model has also been formulated for calculating the species and flow properties profiles based on the chemical kinetics model of this study. The calculation could not be finished because of the limited time available in the research program. Continuing efforts are recommended and will be included in the research program to be proposed for a Mini Grant support.

Physiological Correlates of Behavioral Performance
on the Mathematical Processing Subtest of the CTS Battery

by
Robert L. Yolton

ABSTRACT

The Criterion Task Set (CTS) is a battery of behavioral tests designed to assess mental abilities and information processing. One of the sub-tests within the CTS evaluates mathematical processing ability by asking subjects to solve equations with 1, 2 or 3 mathematical operators (only + or - operators were used). The number of operators establishes the difficulty level of the equations, thus 3 levels were investigated.

In this project, I trained 10 subjects to a criterion level of performance at each difficulty level and then measured the mean time required for them to solve the equations. The following physiological correlates of their performance were also recorded: electroencephalographic (EEG) signals from 3 scalp locations, heart rhythms and peripheral temperatures. Additionally, subjects gave a verbal rating of their perceived workload for the three difficulty levels.

Results indicate that there are complex changes in the late components of the EEG signals which correlate with the time required to solve the equations and with the subject's reports of workload. Variations in peripheral temperature and heart rhythm were small and did not correlate systematically with changes in difficulty levels. Changes in certain physiological systems such as the EEG can, therefore, provide an indication of the degree of workload a subject is experiencing but more refined analyses than were available for use in this study will be needed to detect changes in other systems (eg., heart rhythm).

Application of Finite Element Analysis to Two Disparate Structural Problems: Thermomechanical Coupling and Optimal Sizing of Truss Members

by

Richard W. Young

ABSTRACT

1. Thermomechanical coupling in viscoelastic solids.

The equations of thermal and dynamic equilibrium in polar coordinates of a viscoelastic solid are presented for the case of steady-state vibration. The equations are nonlinearly coupled due to temperature dependent material properties. Finite element techniques are used to reduce the system of seven second-order, nonlinear, partial differential equations to a partially linearized system of algebraic equations in 21 field and auxiliary variables. The equations are partially decoupled and an iterative solution procedure is developed. It is shown that traditional Gauss quadrature fails for this problem and an alternative Gauss quadrature rule is proposed.

2. Optimal sizing of truss members.

Minimum weight design of trusses is simplified by the fact that the elemental stiffness matrices are linear in the design variables (bar areas). This fact has been well exploited in optimality criteria approaches to iterative redesign algorithms. In the enforcement of the optimality criteria, however, dependence of the flexibility coefficients on the bar areas is neglected. This leads to a simple formulation but could result in a retarding of convergence. A reformulation to account for the missing dependence is presented. It can be used for an investigation of the computational trade-offs involved in the inclusion of the dependence.

(M,N)-APPROXIMATION: A SYSTEM SIMPLIFICATION METHOD

by

Ajmal Yousuff

ABSTRACT

This report presents a method for the simplification of systems made up of N interacting subsystems, by approximating only M of the N subsystems. It is proposed to reduce each of the M subsystems while all interactions are active, and to preserve the identities of all subsystems in the overall approximation, as demanded in many situations. Problems of conventional model reduction, controller or compensator reduction, reduction of finite element models, reduction of decentralized controllers, etc., can be treated as specific applications of this method. In this preliminary report, conventional model reduction methods, but constrained to meet the above objectives, are employed. As an application to controller reduction, a new version of balanced controllers is shown to be generated by this method. A numerical example is included which compares the new method with other existing balancing methods, and the results are shown to be in favor of the new method.

The Compound Eye: An Introduction to the Variety of Visual Capabilities, Goals, and Approaches Found in the Class Insecta.

by

David D. Zeigler

ABSTRACT

The following report contains one slightly abbreviated major chapter from a 73-page review paper on insect visual capacity. It was agreed that the variety and depth of topics discussed could not be effectively condensed to meet the 20-page requirements, so the chapter on distance estimation and an abbreviated introduction and bibliography were prepared for this report. The full-length review is on file with Dennis Goldstein at the Air Force Armament Laboratory/Advanced Seeker Division, Eglin A.F.B., FL 32542. Distance information can be gained from the relative "retinal" size and/or speed of visual targets on the surface of the compound eye. Such cues would work most effectively if the true size of the target was in some way "known". Such knowledge is most likely instinctive and "hardwired" for important biological targets which have been consistently encountered over evolutionary time. Speed or movement cues can also result from movement of the observer (motion parallax), and some insects have devised special behaviors (peering, flight oscillations, etc.) to utilize such cues. Binocular or stereoscopic vision may also be utilized by some insects, and there exists a range of mechanisms (in terms of complexity) which can use information from both eyes to estimate target distance.

MICROWAVE IMPEDANCE MATCHING FOR OPTICAL DEVICES

by

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ABSTRACT

One of the major thrusts in fiber optic communication is to replace waveguide. This requires matching of the microwave signal source to the modulating device. Addressed here are the matching requirements for systems using direct modulation of a laser diode, with particular attention to the question of broadband equalization.

Evaluation and Analysis of VHSIC Software Tools

by

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ABSTRACT

The evaluation and description of various VHSIC software tools is presented. The tools investigated were, the Intermetrics VHSIC hardware design language, the GE system designers workbench, and the RTI architecture design and assessment system. These tools have the capabilities of representing hardware in a design language that can be used for specifying the hardware and generating silicon, designing systems through a Buhr graphical representation which can be used to generate the VHSIC hardware design language and ADA code, simulating finite state machines, and the codesign of software modules and hardware processing elements. Recommendations for future work and enhancements in the VHSIC software tool support environment are presented.